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## MISCELLANEOUS

### General

1. RUSSELL, E. J. 63(47)  
Agricultural developments in the U.S.S.R.  
*Nature*, 1943, 152: 525-6.  
Substance of a lecture by Sir John Russell at the Central Council for Health Education Summer School, London, August, 1943.

2. WALTER, H. 581.9(47)  
Die Vegetation des Europäischen Russlands unter Berücksichtigung von Klima, Boden und wirtschaftlicher Nutzung. (The vegetation of European Russia with reference to climate, soil and economic utilization.)  
*Deutsche Forscherarbeit in Kolonie u. Ausland*, Heft 9, P. Parey, Berlin, 1942, pp. 134, RM. 7.40, from review *Angew. Bot.*, 1943, 25: 310-1.  
The book presents a critical summary of recent data scattered in Russian literature.

3. ANON. 634/635(439.1)  
Horticulture in Hungary.  
*Int. Rev. Agric. Rome (Mon. Bull. agric. Sci. Pract.)*, 1943, 34: 206T-8T.  
Brief notes, taken from the review "Berichte über Landwirtschaft", on the main fruit and vegetable crops in Hungary and their location.

### Nutrition

4. THOMAS, W., AND MACK, W. B. 581.144.4: 581.192  
Foliar diagnosis in relation to plant nutrition under different conditions of weather and soil reaction.  
*Soil Sci.*, 1943, 56: 197-212, bibl. 11.  
The experiments, which were carried out at the Pennsylvania Agricultural Experiment Station, refer to the third leaf from the base of *Zea mays*.

5. BRENCHEY, W. E. 631.811.9: 581.14  
Minor elements and plant growth.  
*Biol. Rev.*, 1943, 18: 159-71, bibl. 209.  
A review of present knowledge on the effects of the minor elements on plant growth. Of late less attention has been paid to the physiological function of the minor elements in the economy of the plant than to their practical value in agriculture. As a result there are still very few elements of which it can be definitely said that traces are necessary to plant growth. The importance of boron in plant nutrition is firmly established. There is little direct evidence that copper is actually essential to the plant. Plants are often valuable as carriers of iodine but it has not been possible to show that the plants actually need it themselves. Manganese is a proved ameliorating agent for certain plant diseases. Excess molybdenum in herbages is a causal factor in some animal disorders. There are indications that in some cases traces of the element may benefit the plant. No definite evidence of benefit to plant growth of traces of selenium has been produced. Fundamental work on the effect of traces of zinc on plant metabolism has fallen into the background though its employment in practical agriculture on suitable occasions has given outstanding results. Adequate summaries are given of the work done on these, the more important of the minor elements, and briefer notes on arsenic, barium, cadmium, chromium, cobalt, lead, lithium, nickel, rubidium, strontium, thallium and vanadium.
6. (CHAMINADE, M. R.) 631.8  
On a method for the study of the mineral intake of plants. Estimation of soil reserves.  
*Int. Rev. Agric. Rome (Mon. Bull. agric. Sci. Pract.)*, 1942, 33: 420T-1T.  
M. R. Chaminade (*Ann. agron.*, 1942, April-June) of the National School of Horticulture, Versailles, has worked out a physiological method of estimating soil reserves by forcibly exhausting the medium. Ten barley plants were grown in pots containing 200 g. of soil to which the

indispensable nutrients and a substance of high absorbent capacity (to prevent a toxic effect) were added. The plants were removed from the pot and weighed when development was completed. Further research is required to eliminate experimental errors.

7. KAPPEN, J., AND WIENHUES, W. 631.84: 581.142  
Über die Aufnahme des Stickstoffs der Ammoniumsalze und der Nitrats durch Keimpflanzen. Mitt. I. (The uptake of the nitrogen of ammonium salts and nitrates by seedling plants. 1st report.) *Bodendk. Pflernähr.*, 1942, 27: 311-30, from abstract *Forschungsdienst*, 1943, Vol. 15, abstr. p. 67.

The uptake of nitrogen from ammonium salts and nitrates was tested with seedling plants. In almost all cases the absorption of N from the latter was superior in speed and quantity. Addition of nutrients ( $K_2O$ ,  $P_2O_5$ ) increased N absorption, that from ammonium salts being benefited more than that from nitrates. Liming also had a favourable effect on the uptake of nitrogen. Volatilization of ammonium leading to an imperfect nitrogen balance was noted also in the presence of acid soil reaction.

8. GAHLNBACK, J. 631.346: 631.8  
Dringt Nährlösung durch die Wand des Blumentopfes? (Does nutrient solution pass through the wall of the flower pot?) *Blumen- u. Pflanzenz.*, 46: 114-5, from abstract *Forschungsdienst*, 1943, Vol. 15, abstr. p. 41.

Superphosphate solution added to the soil outside a pot gradually disappeared from the root region both by leaching and by reacting with the pot wall with formation of mucous, insoluble deposits. The pot wall allows the percolation of salt solutions containing phosphoric acid to a limited degree.

9. TURK, L. M. 581.14: 631.87  
The effect of sawdust on plant growth. *Quart. Bull. Mich. agric. Exp. Stat.*, 1943, 26: 10-22, bibl. 3.

The effect upon plant growth of sawdust applications to the soil was studied at East Lansing. A temporary depression generally followed sawdust treatment whether mixed with the soil or applied as mulch. Evidence shows that this effect is due to the increased demand of micro-organisms for available nitrogen in the presence of the carbohydrate material. Addition of 2% nitrogen (225 lb.  $NaNO_3$  or 180 lb.  $(NH_4)_2SO_4$  per ton) to the sawdust in low-nitrogen soils will prevent the depressive effect. Having no fertilizing value the beneficial action of sawdust, if mixed with the soil, rests upon its physical properties, especially its increased water-absorbing capacity and ease of water penetration. As a mulch its main functions are to protect the moist soil from sun and wind and to reduce the surface runoff.

10. LI, L. Y. 631.459  
Fundamental concepts of soil deterioration (I). *N.Z. J. Agric.*, 1943, 67: 177-80, bibl. 9.

The problem of soil erosion is considered under the heads of nutritional, physical, water and biological deterioration.

### Growth substances

11. FRIEDRICH, H. 577.15.04  
Über die praktische Bedeutung von Wuchsstoffen in Gartenbau, Land- und Forstwirtschaft. (The significance of growth substances for horticulture, agriculture and forestry.) *Angew. Bot.*, 1943, 25: 251-73, bibl. 134.

The aim of this survey is to illustrate the numerous applications of growth substances under the following headings:

(1) Rooting of cuttings, (2) grafting and wound healing, (3) forcing, (4) repression of bud bursting, (5) ripening of fruit, (6) germination, (7) stimulation of development through seed treatment, (8) stimulation of development through seedling treatment, (9) fruit setting, parthenocarp, prevention of premature fruit shedding and (10) other possible applications.

12. WITTWER, S. H. 577.15.04: 581.162  
Growth hormone production during sexual reproduction of higher plants. *Res. Bull. Mo. agric. Exp. Stat.* 371, 1943, pp. 58, bibl. 130.

Widely differing types of horticultural plants were used in the author's experiments in Missouri, e.g. cucumber, sour cherry and strawberry. Two cytogenetically important processes associated with sexual reproduction in higher plants were found to stimulate growth. The first is the synaptic reaction initiated within the immature flower bud during gametophyte maturation. The second occurs in the embryo sac at the approximate time of fertilization. These stimulating phases were demonstrated in the cucumber, strawberry, and sour cherry by the treatments of disbudding, deflowering, and defruiting. The greatest growth, accumulation of total nitrogen, and synthesis of carbohydrates occurred in the defruited plants, the least in the disbudded. Deflowered plants were intermediate in growth and nutrient accumulation. The inception of synapsis and syngamy is typified by marked alterations in movement and elongation of the flower stalk (pedicel). In spinach, maximal vegetative extension of the male plants follows the period of most intensive pollen production. Catalase determinations made periodically of the developing inflorescences of the corn plant and pear tree portrayed two peaks in enzyme activity. The first followed synapsis in the microspore mother cells, the second nuclear fusion in the embryo sac. Changes in the relative growth hormone concentration of developing reproductive organs of corn were ascertained by alcohol extraction and bean seedling internode assay. Subsequent to synapsis in the immature tassel and syngamy in the young kernel, there was a marked increase in the growth substances. Crude extracts of the unripe corn grain were unusually active in the setting and parthenocarpic induction of fruit in the tomato. Evidence supporting the concept of two stimulating phases in sexual reproduction is reviewed in other germane investigations. Such data are given a new interpretation and are correlated with the results herein reported. The probable developmental role played by the hormones produced in the reproductive organs is discussed. [Author's abstract.]

13. POUND, F. J. 577.15.04: 551.566.1  
Science marches on. *Proc. agric. Soc. Trin. Tob.*, 1943, 43: 203, 205.

An explanation is given of the practical use to which growth substances could be put in the tropics, for instance, in accelerating the rooting of cuttings, inhibiting bud growth in stored tubers such as yams, inducing seedless fruit by causing parthenocarpic development and delaying the production of flowers of, say, avocado pear or mango so that they produce out of season crops. Tomatoes produced parthenocarpically as a result of auxin treatment are seedless and slightly sweeter than normal. Although auxin spray can be used, the most successful method is to seal up the glasshouse when the flowers are just beginning to open and to fumigate the house for a few hours with a minute quantity of one of the esters in question. Unopened buds are stimulated to open and set and a heavy crop is produced which can be harvested in a greatly reduced period. Somewhat similar action is obtained by the commercial practice of placing a small piece of calcium carbide in the rosette of the pineapple plant and thereby bringing to maturity definite regular daily quantities of pines for canning.



14. GARDNER, F. E., AND COOPER, W. C. 577.15.04: 581.144.4  
Effectiveness of growth substances in delaying abscission of *Coleus* petioles.  
*Bot. Gaz.*, 1943, 105: 80-9, bibl. 11.  
DYKYJ-SAJERTOVÁ, D., AND DYKYJ, J. 577.15.04  
Untersuchungen über Samenkeimung und synthetische Wuchsstoffe. I. Einfluss von Quellungs-temperatur und Wuchsstoffkonzentration auf die Keimung des Weizens. (Germination of seeds and synthetic growth substances. I. Influence of the temperature and concentration of the growth substance solution on the germination of wheat.)  
*Angew. Bot.*, 1943, 25: 274-300, bibl. 26.  
*Theory and practice*
15. WILSON, C. L. 581.462  
The telome theory and the origin of the stamen.  
*Amer. J. Bot.*, 1942, 29: 759-64, bibl. 11.  
The almost universally held theory of the nature of the floral organs as modified leaves is attacked, especially from its inadequacy in explaining the origin of the stamen. A concept of the evolution of the stamen based upon the telome theory is presented. This viewpoint considers that the anther is a syngonium of four sporangia and that this syngonium, together with the filament and connective, has arisen from a dichotomous branch system with terminal sporangia following such processes as fusion and reduction of the fertile telomes (sporangia and their stalks) and other parts of such a system. [From author's summary.]
16. HOLTROP, H. E. 581.45: 575.22  
Tricotyledony.  
*Nature*, 1944, 153: 13-4.  
Tricotyledony, well known as a sporadic occurrence in dicotyledonous plants is shown, as far as brassicas are concerned, to be an inherited character and one which can be easily changed by selection.
17. FISHER, D. V., AND EMBREE, J. J. 581.12  
Automatic control apparatus for maintaining near-constant suction pressure with an electrically operated vacuum pump.  
*Proc. Amer. Soc. hort. Sci. for 1943*, 1943, 42: 473-4.  
The article describes a method of setting up a simple and inexpensive equipment to maintain near-constant suction pressure such as is required in making respiration determinations with fruit.
18. BROWN, R. 581.142  
Studies on germination and seedling growth. II. The effect of the environment during germination on the subsequent growth of the seedling of barley.  
*Ann. Bot. Lond.*, 1943, 7: 275-96, bibl. 13.  
A method is described for culturing isolated embryos in a non-sterile condition.  
*Noted*
19. COUNCIL OF THE HORTICULTURAL EDUCATION ASSOCIATION. 634/635  
A review of the Luxmoore report in relation to horticulture.  
*Publ. (out of series) Hort. Educ. Ass.*, 1943, pp. 14.  
LEHMANN, P., AND SCHANDERL, H. 551.574  
*Tau und Reif, pflanzenwetterkundliche Untersuchungen.* (Dew and hoar-frost, plant-climatological investigations.)  
J. Springer, Berlin, 1942, pp. 18, 3 RM., from review *Forschungsdienst*, 1943, Vol. 15, abstr. p. 10.  
HOUSEMAN, E. E. 551.56: 631.55  
Methods of computing a regression of yield on weather.  
*Res. Bull. Ia agric. Exp. Stat.*, 302, 1943, pp. 863-904, bibl. 4.  
PRESCOTT, J. A. 551.573  
A relationship between evaporation and temperature.  
Reprinted from *Trans. roy. Soc. S. Aust.*, 1943, 67, pp. 6, bibl. 5.  
GARREN, K. H. 632.112: 581.5  
Effects of fire on vegetation of the southeastern United States.  
*Bot. Rev.*, 1943, 9: 617-54, bibl. 167.  
VAN AARTSEN, J. P. 631.459 (68.01)  
Erosion and soil conservation in the Union of South Africa.  
*Int. Rev. Agric. Rome (Mon. Bull. agric. Sci. Pract.)*, 1943, 34: 153T-201T, bibl. 106.  
ERIKSSON, S. 631.83: 631.4  
Untersuchungen über die Einwirkung von Kalisalz auf die Löslichkeit der Bodenphosphorsäure. (The effect of potassium salts on the solubility of phosphoric acid in the soil.)  
*K. LantbrAkad. Tidskr.*, 1942, 81, special number 6½, pp. 1-101, bibl. 81.  
SCHEFFER, F. 631.87  
*Agrikulturchemie Teil c: Humus und Humusdüngung.* (Agricultural chemistry. Part c: Humus and humus application.)  
F. Enke, Stuttgart, 1941, pp. vii + 191, RM. 13.10, from review *Forschungsdienst*, 1943, Vol. 15, abstr. p. 13.  
HOWARD, A. 631.875  
The history of the Indore method of composting.  
*Mon. Bull. Coffee Bd.*, Kenya, 1943, 8: 79-80.  
SHUEY, P. MCG. 631.83  
Determination of potash in fertilizer or base goods in the absence of ammonium salts and organic matters.  
*Industr. Engng Chem. (analytical edition)*, 1943, 15: 633-4, bibl. 2.  
PARODI, L. R. 581.9(82)  
La vegetación del departamento de San Martín en Corrientes (Argentina). (Vegetation of the department of San Martín en Corrientes (Argentina).)  
*Darwiniana*, 1943, 6: 127-78, bibl. 3.  
PRIESTLEY, J. H. 585.1: 581.176.3  
The cuticle in angiosperms.  
*Bot. Rev.*, 1943, 9: 593-616, bibl. 54.  
WOODCOCK, A. H., AND TESSIER, H. 664.8.047  
A laboratory spray drier.  
*Canad. J. Res.*, 1943, 21, Sec. A, pp. 75-8, bibl. 2.  
CRIST, J. W. 519: 634/635  
The coefficient of contingency for horticultural research.  
*Proc. Amer. Soc. hort. Sci. for 1943*, 1943, 42: 484-6, bibl. 7.  
HARTMANN, H. T., AND MCKINNON, L. R. 581.14  
Environmental control cabinets for studying the inter-relation of temperature and photoperiod on the growth and development of plants.  
*Proc. Amer. Soc. hort. Sci. for 1943*, 1943, 42: 475-80, bibl. 7.  
Plans and descriptions.  
MILTON, W. E. J. 631.531: 631.411.3  
The buried viable-seed content of a midland calcareous clay soil.  
*Emp. J. exp. Agric.*, 1943, 11: 155-66, bibl. 22.



## TREE FRUITS, DECIDUOUS

## General

20. USATOV, S. P. 634.1/7(47): 632.111  
**Fruit growing in the north.** [Russian.]  
*Vestnik plodovo-jagodnye kul'tury*, 1940, No. 4,  
 pp. 80-1.

From his experience of 32 years of fruit growing in the north of Russia, the author concludes that the surest method of extending fruit growing northwards is to raise the fruit from seed in the locality in which it is to be acclimatized and then propagate it by grafting on to any hardy stock which is growing in the locality. He intends also to cross the best local varieties, which he has already raised, with varieties brought from the south, and to select the best resulting seedlings. The author cites some actual examples of successful fruit growing so far north of Kirov as 130 kms., and also in the Kajski region of the Kirov Province. Apples, pears, plums, cherries, apricots, gooseberries, currants, raspberries and strawberries have all been grown in these northern parts.

21. MAKAROV, N. P. 634.1/7(47)-2.111  
**The Kirov province must have its own tree and bush fruits.** [Russian.]  
*Vestnik plodovo-jagodnye kul'tury*, 1940, No. 5,  
 p. 103.

This article contains a short account of fruitgrowing in the Kirov province. The possibility of growing fruit successfully in this northern district was shown in 1938 when, during a survey, it was found that trees 15 to 20 years old were growing in private orchards near the Archangel border. They were not affected by the cold or by sun scorch, and produced good yields even without much attention. Among them were the apples Antonovka, Borovinka, Plodovitka and several local varieties. In the most northern part of the province, on the border of the Komi A.S.S.R., thirty-year-old trees were found which could withstand the cold and give yields described as "not bad". Mention is made of yields of fruit (probably pome fruit) amounting to 30 to 35 centners per ha. at some collective farms, and yields of strawberries between 30 and 35 centners. The system, devised by A. D. Kizjurin, of training trees to grow horizontally is to be increasingly put into practice.

22. MICHAÏLOV, A. J. 634.11(47)-2.111-1.521.6: 575  
**Fruit growing in the Karelian-Finnish S.S.R.** [Russian.]  
*Vestnik plodovo-jagodnye kul'tury*, 1940, No. 5,  
 p. 102.

The first attempts at fruitgrowing in the present Karelian-Finnish S.S.R. began in 1935, and several nurseries have since been established. At one of them, two apple varieties have been evolved by means of selection from seedlings, and the fruit of one of the varieties is of very good flavour. A few trees exist 25 to 60 years of age, some of which, on account of their hardness and good flavour, are of great interest to plant breeders. It is hoped to extend fruitgrowing northwards by growing horizontally-trained trees.

23. ŠIŠKIN, D. M. 634.1/7(47)-2.111  
**Some new varieties of fruit in the middle region of the Trans-Urals.** [Russian.]  
*Vestnik plodovo-jagodnye kul'tury*, 1940, No. 5,  
 pp. 69-72.

The middle Trans-Ural region consists of forest-steppe and includes the country east of Sverdlovsk. The soils are degraded black-soil, and more rarely podzol; precipitation is slight—300 to 400 mm.; the prevailing winds are from the west; 45° C. frost may occur; spring frosts usually continue until mid-June, and the autumn frosts begin in early September. The Trans-Ural climate is continental,

with sharp variations in temperature, which may change between night and morning by as much as 30° C. Rarely more than 30 to 35 cm. of snow falls in winter. Apple varieties are few and consist mostly of the Siberian Reinette type and some American crabs. More cultivated varieties brought from elsewhere can only be grown in sheltered places and if trained to grow horizontally. Local varieties however are being sought out, tested and propagated, as well as new ones. Descriptions of some of these varieties and also of a number of cherry, strawberry and black currant varieties are given.

24. MICHURIN, I. V. 634.1/7(47)-2.111  
**How to raise fruit trees in the Urals.** [Russian.]  
*Vestnik plodovo-jagodnye kul'tury*, 1940, No. 4,  
 pp. 12-4.

It is not enough to transfer bodily to the Urals a "ready-made" tree or bush-fruit variety in the form of a young tree or bush, even if it has been growing in conditions which are similar to those in the Urals; before a variety can be considered as truly acclimatized (and not merely naturalized) to new conditions of soil and climate, it must be raised from seed under those conditions. Before describing the method of raising the seedlings, the author explains that a seed from a cultivated fruit variety does not necessarily give rise to wilding fruit of poor quality and small size; the characters are determined by the variety from which the seed was obtained, and by the care and attention bestowed upon the seedling during its development from seed until fruit-bearing. The seedlings of the variety Antonovka, for example, originating from a wild woodland type, usually exhibit characteristics of their wild ancestry, while those of Bellefleur-kitaika, Celebi-alma and its hybrids, all the Anise varieties, Skrizapeli, and the Crimean Synap varieties, if well cultivated, produce fruit which is consistently good but varies in taste according to the climate and soil in which the seedlings have been grown. If warm weather, sufficient moisture and, above all, a mild spring and summer prevail during the first year of the seedlings' life, the cultivated qualities desired are brought out in them; but a cold, dry, windy spring and summer inevitably cause among them some measure of reversion to the wild type. Though a fertile soil may encourage good fruit in a proportion of the seedlings, it will also diminish their hardness and robustness. The inculcation of these characters is best served by growing the seedlings in soil which is somewhat poor and inclined to dryness. Growing the seedlings in a situation facing west (but not east or south), besides ensuring shelter, encourages flowering to take place late in spring when there is little danger from morning frosts. The author next discusses the actual process of raising seedlings from which new local varieties are to be derived. When it is desired to acclimatize to the region of the Urals varieties which are grown elsewhere, seeds obtained from them are either planted directly outside in beds in autumn or, if it is late autumn or winter, in boxes filled with sandy soil. The boxes are then covered with 18 cm. of snow and left at room temperature for about three days. Next they are taken out into the open where, covered with snow, they remain until spring. When three leaves have formed (in addition to the seed leaves), the seedlings are transplanted into a bed where they are set 36 cm. apart, the rootlets being trimmed down to a half or two-thirds of their original length. In the third spring, the seedlings which have proved hardiest and have the best appearance are selected for further improvement. They are planted out 2 metres apart and each spring, until they begin to bear fruit, small superfluous side-branches are cut away, and the other branches kept in check by cutting off from each of them in September one-third of the annual increment of growth. At the beginning of fruit-bearing the final selection is made according to the quality of the fruit. It should be remembered that the first fruits are often hard



to distinguish from their wild prototypes and that they improve only during a period of years. The selected seedlings are now ready to be propagated. Scions from them are grafted on young stocks, not above two years old, of hardy wild species raised locally. The seedlings are next further improved by hybridization; their flowers are fertilized by pollen from varieties brought from outside the locality which have the characters it is required to introduce into the local seedlings. The pollen parent-trees to be used in this procedure are raised in special tubs, baskets or other containers which can be moved under cover for the winter. The hybrid seedlings resulting from these crosses and raised according to the methods already described will possess both the necessary hardiness of the local varieties and the refined qualities of those grown elsewhere.

25. MICHURIN, I. V. 634.1/7(57)-1.523  
Reprint from "To fruit growers of collective farms in Siberia". [Russian.]  
*Vestnik plodovo-jagodnye kul'tury*, 1940, No. 5, p. 4.

Michurin's directions for acclimatizing orchard fruits to severe climates are as follows: Pollen is obtained from any cultivated variety of southern or European origin (which may also include one which has been grafted on wild stock) which it is desired to acclimatize, and is used for fertilizing the flowers of the maternal parent, which should be a wild variety growing locally on its own roots. The hybrid seed of this union must not be sown in fertile and manured land, because the wood formed will be loose in texture and ill-fitted to resist cold; but it must be sown in a sheltered place where the CO<sub>2</sub>, which is produced from the ground, may be assimilated by the leaves and not blown away by wind. According to a footnote, this article by Michurin first appeared in 1934 as a preface to a book by Lisavenko.

26. MICHURIN, I. V. 634.1/7(47 & 57)-2.111  
To fruit-growers of the Urals and Siberia. [Russian.]  
*Vestnik plodovo-jagodnye kul'tury*, 1940, No. 4, pp. 9-11.

The author describes a method of acclimatizing to the conditions prevailing in the Urals and Siberia fruit varieties originating in those parts of Russia west of the Urals and in Europe where the climate is less severe. In the case of orchard fruits the procedure recommended is as follows:—The flowers of a wild variety, which grows locally and is hardy, are fertilized with pollen from a western or foreign variety, the qualities of which it is required to introduce into the local varieties. The progeny of this union is, in its turn, also pollinated by a variety from afar. The resulting hybrid, it is claimed, can compete with the foreign variety as regards quality and possesses the robustness and hardiness of the local variety. Because the seedlings have been acclimatized to local conditions from the earliest stages of their growth, the combination of characters indicated above becomes their permanent possession. In connexion with the procedure described it is asserted that among the characters present in the parents those will predominate in the hybrid which are most favoured by the environment in which the hybrid is to be grown, and that the maternal parent will more completely transmit its characters than the paternal. During a period of many years, the author has observed that hybrid vines grown from seed planted early in spring develop slowly and mature late, while those grown from seed planted late in spring have the opposite characters which, with the further development of the vine, become permanent, especially is this the case whenever the parent vines, even if belonging to one species, are grown in widely separated regions. The author expresses the belief that his observations may enable the vine to be grown not only in the Tambov province but also in the Urals and Siberia, and that they may, perhaps, be found applicable also to other kinds of fruit.

27. IVANOV, M. A., AND PATENŠEV, S. P. 634.1/7(47)-2.111  
The present condition of fruit-growing in the province of Omsk, and the possible trends of its future development. [Russian.]  
*Vestnik plodovo-jagodnye kul'tury*, 1940, No. 5, pp. 97-8.

Though experience has so far shown that horizontally-trained fruit trees are satisfactory for growing in the Omsk province, further investigation into such a method of tree management is necessary before it can be adopted as a general practice. Insufficient is yet known as to longevity of trees thus grown, yields, labour involved in the care of the trees, the protection they may require when grown in steppe lands and the possibility of using machinery for cultivating between rows. In the meantime there are other alternatives which may promote fruit-growing in cold northern districts such as breeding and acclimatization. Several good varieties in Siberia are hardy enough to grow erect. The author points out that by far the largest number of Siberian fruit varieties are of local origin, having been derived from seedlings grown from seed obtained from many varieties in central Russia.

28. ANON. 634.1/2(43)  
Obstbaumbestand in Deutschland. (German fruit statistics.)  
*Obst u. Gemüse*, 1943 (no date), from abstract *Schweiz. Z. Obst- u. Weinb.*, 1943, 52: 494-5.

The number of bearing fruit trees in Germany decreased from 165.9 millions in 1938 to 118.9 millions in 1943, i.e. by 28%. The severe winters of 1939/40 and 1941/42 are the chief cause of this decline. North-east and eastern Germany suffered a loss of 55-60%, whereas damage in south and south-west Germany was slight.

29. JAKOVLEV, P. N. 634.1/7-1.523  
To the memory of I. V. Michurin (on the fifth anniversary of his death). [Russian.]  
*Vestnik plodovo-jagodnye kul'tury*, 1940, No. 4, pp. 3-8.

The outstanding work of Michurin, which the author discusses, was the production of fruit varieties with qualities superior to those of their predecessors and able to be grown in climate and environment where their predecessors could not be grown. These results were achieved not only by sexual but also by vegetative hybridization; in particular, by the method of "mentors". The whole technique of vegetative hybridization arose from the belief which Michurin, like Darwin, held, that there is no fundamental difference between somatic and reproductive cells, and that, therefore, vegetative as well as sexual hybridization can be applied to the plant organism in order to guide its development and modify its qualities and form in the direction desired. It is then pointed out that, whereas ordinary hybridizers, believing in the immutability of the genes and denying the influence of environment, sought to attain their ends by effecting sexual union between varieties or more or less remotely related plant species, Michurin produced hybrid seedlings only as a preliminary to their subsequent modification by vegetative hybridization; in his hands the importance of parentage and nature was diminished and that of environment and nurture increased.

- 30: BORISOGLEBSKI, A. D. 634.1/7(57)-1.523  
The founder of scientific fruit-growing in Siberia. [Russian.]  
*Vestnik plodovo-jagodnye kul'tury*, 1940, No. 5, pp. 6-14.

A short account is given of the life and work of N. F. Kaščenko who produced many new varieties of apples, peaches and apricots capable of withstanding the severe climate of Siberia. The characters and origin of some of them are briefly described. He also acclimatized or produced new varieties of medicinal and other plants, and was



among the first to breed dry-land rice, a crop which under irrigation near Kiev yielded at the rate of 20 centners per ha. As regards his methods of acclimatization, for which he was particularly noted, he employed separately or in combination those of selecting successive generations of seedlings, grafting, and hybridization. Where necessary, he grew hybrid seedlings in sheltered conditions, cutting down the shelter by degrees with each succeeding generation; or he advanced his hybrids gradually from their places of origin towards the localities where they were required, each generation being grown nearer to the final goal than the preceding one.

31. STEPANOV, P. A. 634.11-2.111  
A half-century of work by a disciple of Michurin,  
A. I. Olonichenko. [Russian.]  
*Vestnik plodovo-jagodnye kul'tury*, 1940, No. 5,  
pp. 115-7.

Since 1894, when he began to establish fruit-growing in Siberia, Olonichenko has produced several varieties of apple, eight of which are described in the present article. One of these, "Poljarnoe" (Polar), deserves special mention. It was raised from seed obtained at an orchard in the Sparrow Hills near Moscow. The seeds were selected from the best but typical specimens of fruit belonging to the summer variety of "Arkad dymchatyi", which is the only tree in Eastern Siberia bearing large fruit and growing easily in standard form. When the seedlings came into bearing their fruit was small, of somewhat poor quality, and not typical. But when they were grafted on the Siberian crab and planted on newly ploughed clayish soil, the fruit grew better in all respects. The trees themselves withstood 60° C. of frost and even at that temperature showed practically no effects. Olonichenko attaches great importance to the application to the trees of whitening with which iron sulphate has been mixed. The mixture protects the trees from the scorching dry winds of spring which in Siberia do even more damage than the cold.

32. KEMMER, E. 634.1/2: 581.084.2: 519  
Über die Anordnung der Versuchspartzellen im  
Obstbau. (The layout of experimental fruit plots.)  
*Dtsch. Obstb.*, 1942, H. 10, from abstract For-  
schungsdienst, 1943, Vol. 15, abstr. p. 42.

Under very favourable external conditions and particularly with long-lived vigorous trees, the one-tree-plot with six replications may suffice. Instructions for the layout of experimental plots for fertilizer and other trials, will be found in the author's book on the principles of soil management in the orchard (*H.A.*, 8: 1335). For trials in pruning and pest and disease control the 3-tree-plot should be the minimum, but the number of replications might be reduced. In rootstock trials the following combinations are considered to conform with minimum requirements:—Type IX, II, V with a planting distance of 4×5 m.: four 3-tree-plots; Types I, IV, XI with a planting distance of 5×7 m.: three 3-tree-plots; Types XII, XVI and seedlings with a planting distance of 8×10 m.: three 2-tree plots. In windbreak plantation trials the length of the hedge should not be less than 50 m. Since shelter provided by a hedge extends to about 10 times its height the testing of an area 100-120 m. in depth may be regarded as sufficient. The trial area is conveniently divided into four groups: (1) that in which the trees are exposed to the shade and root competition of the windbreak; (2) where they are well sheltered; (3) where they are adequately sheltered; (4) where shelter conditions approach those in the control areas.

33. HATTON, R. G. 634.1/7  
An amateur's fruit garden.  
*J. roy. hort. Soc.*, 1943, 68: 361-74, bibl. 10.

In his lecture to the Royal Horticultural Society the Director of the East Malling Research Station gives an account of the application of expert knowledge to the layout and upkeep of a private fruit garden. The result, not achieved

without some failures in the first instance, appears to be a marvel of variety and planned succession of choice fruit on a limited space, well worth studying. Special attention is given also to small fruit and its protection from birds as well as to the utilization of wall and fence space. Discussing the fundamental question of rootstocks the author advises the use of No. IX and Malling Quince C for back yards, but has to admit that the problem of dwarfing plums and sweet cherries has not yet been successfully solved, the nearest approach for plums being vegetatively raised Common Plum. The lecture is supported by two plans for model fruit gardens and a diagram showing the comparative crops of apple trees on different rootstocks at various ages. Further trials on a larger scale in respect of amateur fruit gardens are being carried out at the gardens of Bradbourn House now in the possession of the East Malling Research Station. It is noteworthy that the aesthetic effect is given due consideration.

34. COOK, H. H. 634.11-1.541.11  
Fruit tree planting.  
*Gdnrs' Chron.*, 1943, 114: 90-1.

In the course of an article on fruit tree planting the author remarks that at Reading University Horticultural Station, where the soil is deep and fertile, Cox's Orange Pippin does particularly well on Malling No. II rootstock, but where the soil is shallow or poor in fertility or the average rainfall is less than 24 inches the better stock would be M. XIII. The suitability of M. II for Cox on soil of the nature indicated is borne out by J. J. Brown from Essex (*ibidem*, p. 174) who states that in 8 years his cordon Cox's had reached a height of 16 feet and were studded almost to the ground with fruit spurs. Ribston Pippin, Gravenstein, Margil, James Grieve, Claygate Pearmain, Orleans Reinette, Egremont Russet but not St. Everard are equally healthy on this stock.

35. SIMAKOV, N. S. 634.11-1.536  
Dates of planting apple trees in the Krasnojarsk  
Province. [Russian.]  
*Vestnik plodovo-jagodnye kul'tury*, 1940, No. 5,  
pp. 84-9.

In order to determine the most suitable season and date of planting apple trees, an experiment was carried out from 1934 to 1936 at the Krasnojarsk Horticultural Experimental Station and supplemented by observations at neighbouring collective farms. A description of the experiment is given in which six varieties of one-year-old Reinette apple trees were used and the resultant growth noted. Results show that planting in autumn was, on the whole, better than planting in spring, provided that the trees were protected from the wind and that there was plenty of snow. Considerable detail is given of variation according to time of planting in the spring and to variety.

### Varieties

36. EDGEcombe, S. W. 634.1/7  
Fruit for the family.  
*Bull. la agric. Exp. Stat.* P42, 1942, pp. 415-20.

A list of fruits and their varieties recommended for Iowa small fruit plantations and home orchards is given, preceded by useful hints on selection of stocks, planting, etc.

37. SHAW, J. K. 634.11-1.521  
Descriptions of apple varieties.  
*Bull. Mass. agric. Exp. Stat.* 403, 1943, pp. 187.

The vegetative characteristics of 91 apple varieties commonly grown in America are described in order to facilitate identification in the nursery and to serve as a record for future generations. Details of the following characters are given:—Tree, shoots, bark, lenticels, leaf blade, serrations, surface. The photos are taken from specimens known to be true to name and include pictures of typical leaves, one-year whips and two-year trees. In most cases



the flowers are also shown, but are not described in the text. More than half of the space is devoted to illustrations.

38. SIMMONDS, A. 634.11-1.523

Mr. Cox of "Cox's Orange Pippin".

*J. roy. hort. Soc.*, 1943, 68: 347-9, bibl. 2.

Mr. Richard Cox on his retirement from breeding in 1820 or thereabouts lived at Lawn Cottage, Colnbrook, Middlesex, and there, it seems, the famous apple was produced. Its exact origin is now somewhat obscured in legend but at least a plausible account was given in *The Garden* for May 1876. Even then the evidence is far from first hand. It runs as follows:—"Mr. Turner informs us that this apple was raised by Mr. Cox of Colnbrook in 1830. Of two pips of 'Ribston' sown in a pot by Mr. Cox, one turned out to be 'Cox's Orange Pippin' and the other 'Cox's Pomona'. These Mr. Cox gave to Messrs. E. Small & Son, Nurserymen, Colnbrook, in 1836, and they were sent out by that firm four years later."

39. LJUBOČKO, O. N. 634.11-1.521

Valuable but little-known varieties of the Reinette apple of the Krasnojarsk Province. [Russian.] *Vestnik plodovo-jagodnye kul'tury*, 1940, No. 4, pp. 42-4.

Some 200 apples belonging to what is described as the Reinette class [the term Reinette does not nowadays, in England at any rate, connote any special characteristic.—Ed.] have been listed in the Krasnojarsk Province and detailed descriptions are given of the characteristic features of 9 of them in this article.

40. JAKOVLEV, L. I. 634.11-2.111

The Baskirski Krasavec apple. [Russian.]

*Vestnik plodovo-jagodnye kul'tury*, 1940, No. 5, p. 75.

The good points of an apple variety Baskirski Krasavec are given in this article. It is more winter-hardy than Antonovka obyknennaja and Koricoe polosatoe, though only slightly less so than one of Michurin's varieties Kitaika zolotaja rannaja. Its yields are high and well maintained from year to year. It comes into bearing earlier than most varieties; only Taenoe can compete with it; both these were observed to flower in the nursery on one-year-old trees. Its fruit keeps until February or even May. It is a variety which should be tried out in parts neighbouring on the Baskir A.S.S.R. and particularly in the provinces of Kirov, Sverdlovsk, Celjabinsk and others where the climate is severe.

41. DUBOVIE, N. V. 634.11-1.541.11-2.111

A weeping form of the Chinese apple (*Malus prunifolia*). [Russian.]

*Vestnik plodovo-jagodnye kul'tury*, No. 5, 1940, p. 109.

The editors express in a footnote their disagreement with A. D. Kizjurin's belief that fruit in cold climates must be grown on horizontally trained trees. They are of the opinion that this is only one method of procedure, and that the breeding of hardy varieties with trees to be grown erect has been, and must continue to be, the main concern of those who seek to extend fruit-growing northwards. According to Kizjurin, in order that full advantage may be taken of the conditions, as yet little understood, which prevail in the atmosphere just above the surface of the ground, trees should not only be trained to the horizontal position, but new varieties bred in which such a position is naturally assumed in growth. It is in fulfilment of the latter purpose that the author of the present article suggests the use of *Malus prunifolia* Borkh. f. *pendula* hort. as a stock facilitating the horizontal training of the scion. The species does not grow higher than some 90 cm. from the ground, is slow growing, dwarfs the scion, and bears fruit the size of cherries. Even if the scion be grafted near the base of the stock, a

horizontal position of the scion may still be achieved. That it can be propagated by seed is considered a valuable quality of this species. The weeping variety of the species may prove of value also in hybridization. The weeping variety of *M. prunifolia* may also serve the same purpose and prove to be even more interesting, for, judging by its fruit, it is nearer to a cultivated type than *M. prunifolia*.

42. MAKAROV, D. D. 634.13-1.55

A pear tree producing three crops of fruit a year.

[Russian.]

*Vestnik plodovo-jagodnye kul'tury*, 1940, No. 5, pp. 113-4.

At the village of Salme, Gagrinski district, Abkhazian A.S.S.R., there is a pear tree ten years old which yields three crops of fruit every year. In the spring of 1930 the owner of the tree was given a cutting, about the origin of which he knew nothing except that it came from the province of Sukhum. He grafted it on a wild pear stock in his garden and it bore fruit in 1935. What attracted his notice was the three successive periods of flowering which then occurred, followed by the production of three separate crops of fruit. The first flowering began in May and was thus later than flowering in other varieties; and the fruit ripened in July. The second flowering occurred in June and fruit was ripe in mid-September. The third flowering was in July and the fruit ripened and fell immediately in December. The second crop was smaller than the first, and the third smaller than the second. The fruit of each crop differed from the others in size, shape, appearance and taste. The author gives a detailed description of the tree and fruit which he himself observed in September 1940. Several cuttings from this tree have been established and results are being awaited.

43. CROCE, F. M. 634.16

El nispero común. (The loquat.)

*Rev. B.A.P.*, 1943, 26: 311: 41-3, 45-6.

Although not grown on a commercial scale the transport of an appreciable quantity of loquat fruit (*Eriobotrya japonica*) is recorded by the Ferrocarril Pacifico from Mendoza Province to the various towns. The fruit would certainly pay to cultivate on a larger scale. It is the earliest to ripen and a little propaganda on its excellent qualities would soon create a good demand. The fruit is described and analysed. The Mendoza trees are all raised from seed and consequently are very heterogeneous, the majority being of no commercial value. A good commercial variety should have a strong rather than a weak flavour, a strong perfume and be of large size. Size can be increased by proper pruning, fruit thinning and manuring. The fruit should contain 2 or 3 seeds only instead of the usual 5 or 6 and for successful transport have a strongly adhering peduncle, tough skin and firm pulp. Early ripening varieties will face less competition in the markets and fetch a higher price. Disease-resistant varieties should be sought. Varieties recommended in California are listed as a guide. When the fruits are 1 to 2 cm. in diameter the bearing racemes are bagged in newspaper, a practice which improves appearance and colour and hastens maturity by several days besides protecting against insect attack. A good worker can bag up to 2,000 racemes a day. For eating fresh the fruit is picked when perfectly ripe, that is, 8 or 10 days after reaching full colour, at which stage flavour and perfume are at their best. Some varieties, if not picked when ready, will rot, but the majority begin to wrinkle and end by drying up on the tree. For culinary purposes such as jellifying the fruit should be picked before it is completely ripe, though for certain products such as jam or syrups over-ripeness is preferable and the hard ripe stage for juices processed by the Apert method. The average picker will collect 300 to 400 kg. per day. Technical information is given on the various market packs and standards.



# Propagation

44. BOBROV, A. I. 634.1/2(57)-1.537  
The Rubcov nursery. [Russian.]  
*Vestnik plodovo-jagodnye kul'tury*, 1940, No. 5, p. 107.

The nursery of the Rubcov district in Siberia (somewhere near the Altai province) was begun in 1927, long before fruit-growing in Siberia was considered possible. Its output has increased, and among the apple varieties in its propagation section are many which are described as new. Buds of these and others were worked in 1939. In 1940, a propagation section was established to raise rootstocks from the seed of *Pyrus ussuriensis*. There is also a section devoted to raising Siberian crab seedling rootstocks.

45. DUCININ, I. I., AND KRUGLOV, A. I. 634.1/7(57)-1.537  
The largest nursery in Siberia. [Russian.]  
*Vestnik plodovo-jagodnye kul'tury*, 1940, No. 5, pp. 104-6.

The Isil'kul' Horticultural Nursery established in 1902 138 km. west of Omsk, is now one of the largest in Siberia. Trees, bushes and other plants, both useful and ornamental, are raised there and widely distributed in the surrounding areas. Among its products are many varieties (given by name in this article) of one- and two-year-old apple trees, and pears, trained in various forms, selections of the Canadian and Ussuri plums, also cherries, gooseberries, black currants, strawberries and June berry. The nursery also produces rootstocks for apples and stone fruits. In this connexion the authors say that there is a shortage of pear stocks; the Ussuri pear is considered the best stock on which to graft cultivated pear varieties, but few specimens of it are to be found growing in the province. For the same reason certain valuable cherry varieties can also be propagated only in small numbers. The cause of this scarcity is attributed partly to the fact that almost no other fruits but the apple are grown at the collective farms in the province. The only stock for cultivated cherries which has been used hitherto is the "steppe cherry" (*Prunus chamaecerasus*). Though this species is hardy and ensures good yields, only a small proportion of the scions grafted on it become established. Since 1938 many cherry varieties have been budded on *Prunus virginiana*. A large proportion of the unions were successful and this cherry species gives promise of being a good stock. In 1939 a search was begun for stocks suitable for stone fruits. Seedlings of the following species are being tested for this purpose: Virginia bird-cherry (*Prunus virginiana*), Japanese cherry (*P. japonica* sand cherry (*P. besseyi*), *Prunus padus* Canadian plum (*P. nigra*), Ussuri plum (*P. triflora*), dwarf almond (*Amygdalos nana*), Manchurian apricot (*P. mandshurica*), Siberian apricot (*P. sibirica*) and sloe (*P. spinosa*). Pear rootstocks have been sought since 1930. Among those that were tried were hawthorn species; fruit-bearing specimens of pears grafted on them were produced but found unsatisfactory. Then *Amelanchier vulgaris* was tried and 93% of the unions were successful. This stock is considered likely to be in value second only to the Ussuri pear. Other items of interest which are produced at the nursery or being investigated with likelihood of success are vines which complete their growth before the cold weather; cherries which can be grown without protection and will soon be ready for propagation; and, finally, varieties selected from the Canadian plum which may be grafted on it and on the sand cherry. They are now being propagated by budding. The original Canadian plum comes into bearing 4 or 5 years after the planting of the seed, and 3 years after grafting.

46. MUGUERZA, A. 634.63-1.532/535  
El olivo; sus diversas formas de multiplicación.  
(Various ways of propagating the olive.)  
*Alm. Minist. Agric., B. Aires*, 1940, 15: 143-7.

The olive can be vegetatively propagated by cuttings,

suckers, layers and ovuli as well as by budding or grafting. The stocks for grafting are grown from the seed of any cultivated sort or of the wild olive (*Olea europea oleaster*). To ensure germination the seeds are soaked in a solution of 5 kg. carbonate of soda per 100 litres of water to treat 80 kg. of seed. After soaking from 3 to 5 hours the seed is taken out; left for 15 days under light shade, then stratified in alternate layers of sand and poultry manure, usually in a box provided with drainage holes, where it remains for 45 to 60 days or until the seed coats begin to crack. At this point the seeds are set out in nursery beds at a spacing of 15×40 cm., for shield budding at 30 cm. above soil level two years later. In U.S.A. the method of hastening germination is to clip the pointed end of the seed. This can be done mechanically at the rate of 1,500 seeds an hour. The process is followed by immersion in water for 15 days. Propagation by softwood cuttings is made from year-old shoots cut to 15 cm. and deprived of all leaves except the top two. These cuttings are planted in sand under glass, preferably with heating. Four or five months later those sufficiently rooted are potted up into 2½-inch pots, grown on for a year, at first under glass and later under outdoor shade and finally planted out in the nursery to await disposal. Hardwood cuttings are taken in winter from 3-year-old wood of about 3 cm. diameter and cut 30 cm. long, side twigs and leaves being trimmed off. They are set on a slant and almost completely buried in light sandy soil containing some humus. In about 2 years they will be well enough rooted to be transferred to the nursery for a further two years' attention before planting out. Woody cuttings laid horizontally and covered to a depth of 5 to 10 cm. give about 50% success. *Stakes*. In Spain sections 1 metre long by 5 to 8 cm. diameter are planted three at a time on their permanent site in holes 80 cm. deep by 80 cm. diameter, filled with good earth and regularly watered. They become established in about 2 years. *Suckers*. To obtain these the earth is mounded up around the selected tree and the soil kept permanently moist. In about two years there will be available a number of suckers sufficiently well rooted to transplant to the nursery. Here they are pruned to a uniform height of 50 cm. and remain 2 or 3 years until finally planted out. If a great number of suckers are required the parent tree is cut down close to the ground, unless it happens to be a budded or grafted specimen. *Layers*. Suckers and small branches near the ground are pegged down onto a bed of specially prepared soil and covered to a depth of 10 cm. A small strip of bark 5 to 10 cm. long is removed from the underside in contact with the ground. *Ovuli*. These protuberances are sliced off the trunk and set in a mixture of good soil, sand and farm manure, water being given freely. The following year the weaker shoots, which by then will have grown out, are removed and the sturdier trained upright to sticks, to be planted out a year or two later.

47. TIHONOVA, A. S. 631.541  
A new binding material for grafts. [Russian.]  
*Vestnik plodovo-jagodnye kul'tury*, 1940, No. 5, p. 11.

Insulating tape is recommended as a substitute for the normal binding materials used in grafting. As a result of its use, union may be established in 100% of cases and much time saved both in tying on the tape and loosening it when it becomes too tight. About 15 cm. of tape are required for each graft.

48. MARGOLIN, A. P. 634.741: 634.11 + 634.13: 631.541.11  
A method of propagating *Amelanchier vulgaris*. [Russian.]  
*Vestnik plodovo-jagodnye kul'tury*, 1940, No. 5, p. 108.

Michurin found that *Amelanchier vulgaris* could replace both the Paradise stock for apples and the quince for pears. The union which it formed with a scion was firm and it



exercised a more pronounced dwarfing effect upon the scion than did either of the stocks mentioned above. Because the seed of *Amelanchier vulgaris* gives rise to variable progeny, and its root suckers make poor stock with a weak root system, a method of stimulating the production of offshoots was tried by earthing up in the manner described. One-year-old plants were planted in the spring of 1937. In the spring of 1938 the stem was cut off, leaving a stump 3-5 cm. long, in order to encourage the production of shoots from dormant buds on the stem, and also of root suckers. On 10 July during wet weather, the shoots and suckers which had grown were earthed up to one-third of their height in order to encourage the formation of roots: a process which was found very slow; six weeks after earthing up only slightly developed adventitious roots were to be seen. On 12 November the earth was withdrawn, the shoots and suckers were counted, and their ability to strike root observed. The conclusion was drawn, after comparison with root suckers from plants which had not been earthed up, that *Amelanchier vulgaris* can be satisfactorily propagated by means of the method described above and provides good stock. It is believed that the early-ripening, dwarf apples and pears, which it makes possible, will be able to be grown still farther north than has been possible hitherto.

49. BOWMAN, F. T. 634.11-1.541.11: 581.144.2  
**Root types among apple clones raised from root cuttings.**  
*J. Aust. Inst. agric. Sci.*, 1943, 9: 127-9, bibl. 4.  
 Clonal rootstocks from crossbred apple seedlings which showed good vigour and freedom from woolly aphis were raised at Bathurst and New England Experiment Farms, New South Wales. The trees were propagated by root cuttings as this method offered advantages in the favourable coastal climate at Narara. The cuttings, 5-6 in. long and varying in diameter between the thickness of a lead pencil and a slate pencil, were set 3-4 in. apart in nursery rows 3 ft. apart, with their tops protruding slightly above soil level. After 2 years' growth the material, then 4½ to over 6 ft. high according to clone, was carefully lifted and the roots used for cuttings. Each clone has a uniform and characteristic root type, but there is a continuous variation over the whole range of root systems shown, which may be divided into 3 groups: (1) Crown-rooted clones which produce a mass of fibrous root spreading laterally in the soil without good anchorage roots, (2) intermediate types having fibrous roots which also have anchorage roots, (3) tap-rooted clones without fibre clusters arising from the root piece.

### Rootstocks

50. ANON. 634.1/2-1.541.11  
**Field day at research orchard.**  
*Orchard. N.Z.*, 1943, 16: 10-6-7.  
 At a growers' meeting held at the research orchard, Havelock West, N.Z., results obtained with Malling stocks were reported. No. 1 was no improvement on the N.Z. type Northern Spy. No. 9 was a dwarfing stock, useful for testing new varieties quickly and for small gardens. No. 12 produced a larger tree than Spy. It had a deep rooting system and was valuable for replacements where Spy so often failed. It was the most valuable stock tested. No. 13 produced a larger tree than Spy but was very susceptible to root-rot in wet soils. No. 15 made a vigorous tree but was slow in coming into bearing. No. 16 combined a good tree and heavy cropper. Nos. 12 and 16 were recommended. There was no evidence that the less vigorous stocks produced better coloured fruit. Intelligent pruning of trees on vigorous stocks was required to obtain maximum colour. Unthrifty trees on Spy should be replaced by Nos. 12 or by 16 in borderline cases or where too much growth was feared. For other fruits European plum was too dwarfing for peach

and seedling peach was to be preferred. Golden Queen was used in Auckland but there was no evidence of any particular peach being better than others, as a rootstock. For apricot, apricot or cherry plum stocks, and for cherry, mazzard were recommended.

51. PAVSKI, V. A. 634.11(47)-1.541.11-2.111  
**Apple rootstocks in the area of the river Kama, Molotov district. [Russian.]**  
*Vestnik plodovo-jagodnye kul'tury*, 1940, No. 5, pp. 77-81.

The following varieties of apple seedlings were studied at the Botanical Gardens of the Molotov University; a Siberian apple, *Malus prunifolia* [the Chinese apple] (including cultivated local forms of it), the Russian varieties Anise, Antonovka, Borovinka, and others, and what is described as a woodland apple. Seeds of these varieties obtained from various sources were stratified in the usual manner, and the growth of the seedlings observed for 11 years (1928-1939). They were grown on land near a small river which consisted of a humus layer of 20 cm. overlying sand 4 to 5 metres in depth, beneath which was impervious clay. Manures were applied to the growing seedlings. With a view to determining which of the varieties, when grown under local conditions, would prove suitable as rootstocks for any other varieties needing to be acclimatized, the following points were studied: hardiness, annual growth increment in shoots and roots, pests and diseases, dates of sap flow, bud formation and leaf-fall. The Chinese apple proved to be the best, though the others are also recommended for use in breeding work.

52. BRYNER, W. 634.11-1.541.11  
**Zur Wahl des Saatgutes für die Anzucht von Apfelunterlagen. (Seed selection for the raising of apple stocks.)**  
*Schweiz. Z. Obst-u. Weinb.*, 1943, 52: 546-7.

A brief account of preliminary results obtained at Wädenswil in pursuit of a scheme to raise suitable scab-resistant apple rootstocks from seed in order to overcome the present shortage. Particulars are given of 10 local varieties.

53. KEMMER, E. 634.1-1.541.11  
**Die Kernobstunterlagen. (Rootstocks for pome fruit.)**  
*Merkbl. Inst. Obstbau Univ. Berlin*, 4, R. Bechtold & Co., Wiesbaden, 3rd edition, 1942, RM. 1, from review *Forschungsdienst*, 1943, Vol. 15, abstr. p. 19.

The problem of seedlings or clonal material as rootstocks for pome fruit and the difference between seedlings of diploid and triploid varieties are discussed in detail. Although seedling rootstocks show less uniformity of growth in the nursery and take longer to raise, they should not be considered inferior to clonal rootstocks. As a result of his own investigations and growers' experiences the author comes to the conclusion that uniform, vigorous plants, irrespective of their origin from seedlings or stool beds, are the basis of uniform orchards.

54. GÜNTHER, F. 634.1/2-1.541.11  
**Der neue Obstbau. (New fruit growing.)**  
 Trowitsch & Sohn, Frankfurt a/O, 1942, pp. 148, RM. 5, from review *Forschungsdienst*, 1943, Vol. 15, abstr. p. 19.

The author advises the abandonment of standard and half-standard fruit trees and the adoption of bush trees on seedling, not clonal, stocks of 60-70 cm. in height. These so-called "quarter-standards" are said to root better and require neither staking nor other special treatment. [Nothing is said in the abstract as to the source of such seedlings.—Ed.]



55. TRENKLE, R. 634.1/2-1.541.11  
Beitrag zur Unterlagen- und Stammbildnerfrage.  
(Contribution to the rootstock and stem builder problem.)  
*Dtsch. Obstb.*, 1942, H.1, pp. 3-9, from abstract  
*Forschungsdienst*, 1943, Vol. 15, abstr. p. 18.
- A demand is made for the wider use of frost-hardy stem builders in German orchards as shown to be necessary by the winter 1939/40 and the observation that the greatest fluctuations in air temperature occur up to 1-50 m. Seedlings from local, frost-hardy diploid pear and apple varieties should be used for the purpose. If both scion and seedling are frost-hardy the danger of frost damage to the union at the root collar is not great, even where rootstock and scion differ in their rate of growth. From figures given for the losses of seedlings and for the time they require to reach standard height it is concluded that it is uneconomic to raise seedlings in the nursery. A comparison of double-worked trees and trees budded once at the root collar showed that the former were superior in stem and head growth. Trees of Winter Rambour double-worked with Roter Trierer Weinapfel as an intermediate were superior in growth to Winter Rambour on seedling Winter Rambour roots and on seedling Roter Trierer Weinapfel roots. Suberization and reduced elasticity of the seedling's bark was the cause of strong tension and deep penetration of frost damage. [The German abstractor is not clear as to the author's general conclusions.—Ed.]
56. RUDORF, W. 634.1/7-1.541.11  
Bemerkungen zum Wiederaufbau des deutschen Obstbaus. (Remarks on the reconstruction of German fruit growing [with special reference to rootstocks].)  
*Dtsch. Obstbau*, 1942, pp. 193-7, from abstract  
*Forschungsdienst*, 1943, Vol. 15, abstr. p. 39.
- Discussing the steps required for the reconstruction of German orchards the author demands that the use of seed of unknown origin by nurseries should be made illegal. Government controlled fruit seed production should be linked to fruit utilization organizations. Investigations into the affinity between seedling stock and scion is of great urgency. Seedlings of the apple variety Lithuanian Pippin are said to afford most suitable rootstock material, the self-fertility of the variety making for almost homozygous seedlings. Seed could probably be got in large quantities from trees growing wild in Bulgaria, but cultivation of certain varieties for seed production by cross breeding is also of importance. The value of seedling stocks is thought to have been under-estimated and there are many instances of trees worked on clonal rootstocks lacking uniformity and frost hardness. Other points to be considered are the genotypical properties of the root system serving as rootstock. *Malus baccata* and especially *M. prunifolia* seem to constitute suitable material for the selection of rootstock clones. *Amelanchier vulgaris*, *Crataegus dsungarica*, *C. monogyna*, and *C. melanocarpa* could be used in breeding pear stocks. *Prunus chamaecerasus*—of which there are very many forms in Tscheljabinsk—in breeding sour cherry stocks. *Prunus insititia* (vegetative and from seed), *P. spinosa*, *P. beteljvi* and *P. triflora* are mentioned as suitable plum stocks.
57. JENKINS, E. W. 634.13: 581.145.1  
Blossom position in pear clusters and set of fruit.  
*Bull. Vi agric. Exp. Stat.* 471, 1941, pp. 24, bibl. 4.
- Blossoms of pear trees situated at the cluster base were found to set in a higher percentage after pollination than the upper blossoms of the same cluster. As the number of blossoms on a cluster increased from 5 to 7, however, more fruit developed on the terminal flower. In each case the blossom below the terminal was the weakest of the cluster. A nearly uniform set of the lower blossoms resulted from

### Pollination

- removal of the upper blossoms from the cluster. That blossoms in all positions are potentially capable of developing fruit was shown by leaving only one flower on a number of clusters. There was no correlation between size of the fruit 10 days after pollination and retention on the cluster.
58. ANON. 581.162.3: 634.11 + 634.13  
I. Fechas de floración. II. Interpolización de las variedades. (I. Fruit blossom dates. II. Cross-pollination of pears and apples.)  
*Sugest. oportuna. Fruticult.*, Rio Negró, August 1943, pp. 1-3.
- I. A table of blossoming dates, showing first flower, full flower and petal fall of the commonly grown commercial apples and pears of Argentina. The pears in question are: Anjou, Packham's Triumph, Winter Nelis, Winter Bartlett, Williams, Aremberg and Comice. The apples are: King David, Delicious, and Coloured Delicious, Jonathan, and Coloured Jonathan, Yellow Newtown Pippin, Grannie Smith, Coloured Stayman, Coloured Winesap, Cox's Orange Pippin, Rome Beauty and Glengyle Red.
- II. Pears. Comice is a poor pollinator but is pollinated by all the other varieties flowering at the same time. Anjou sometimes flowers earlier than the other varieties, but Packham's, Winter Nelis or Williams, if planted near, will pollinate enough of the Anjou flowers to produce a crop. Apples. Winesap and Stayman are unreliable as pollinators. Rome Beauty and Glengyle Red also require a pollinator in order to set a full crop, they will not interpollinate and the only other suitable one for the purpose is King David which, though flowering earlier than any in the list, remains in bloom long enough to pollinate the latest. Rome Beauty and Delicious are no good together since their flowering times do not overlap.
59. MÖHRING, A. 634.1/2: 581.145.1  
Kann eine bessere Anpassung der Blüte unserer Obstsorten an den Einzug des Frühlings erfolgen? (Can the flowering of our fruit trees be better adapted to the beginning of spring?)  
*Dtsch. Obstb.*, 1942, H. 8, p. 142, from abstract  
*Forschungsdienst*, 1943, Vol. 15, abstr. p. 57.
- Soil temperature should be more taken into consideration when ecological problems of fruit growing are dealt with. The abstractor of Möhring's article suggests that regular readings at 2 p.m. were required at depths of 20, 30 and 50 cm. Observations in recent years have borne out W. Naegler's statement that apples begin to flower when the soil temperature at a depth of 0.5-1.0 m. reaches 10° C. ("Die Erdbodentemperaturen in ihren Beziehungen zur Entwicklung der Vegetation", *Petermanns Mitt.*, 1912). The following are figures from Naegler:—Apples will begin to flower 22-28 April, when the soil temperature at a depth of 0.5-1 m. during March-April is 6° C.; 29 April-5 May with a March/April temperature of 5½-6° C.; and 6-12 May with March/April temperature of 4½-5½° C.
- Growth and nutrition
60. BLASBERG, C. H. 634.11: 581.145  
The relation of size of McIntosh flower buds to the production of fruit.  
*Proc. Amer. Soc. hort. Sci. for 1943*, 1943, 42: 220-2, bibl. 3.
- At Vermont Experiment Station the larger terminal buds of McIntosh apple spurs matured a significantly higher percentage of fruits than did the smaller buds over the two years of the experiment.
61. BOYNTON, D., AND COMPTON, O. C. 634.1/2-1.433  
Effect of oxygen pressure in aerated nutrient solution on production of new roots and on growth of roots and tops by fruit trees.  
*Proc. Amer. Soc. hort. Sci. for 1943*, 1943, 42: 53-8, bibl. 3.
- A decrease in oxygen pressure of the gas continuously in equilibrium with the rooting medium to three-quarters of



that found in air caused marked decrease in the number and weight of new roots and in the top growth produced by apple, prune and peach, the effects being produced without appreciable increase in the carbon dioxide pressure in the rooting medium above that in air.

62. ALLMENDINGER, D. F., KENWORTHY, A. L., AND OVERHOLSER, E. L. 634.11-1.432.2  
The carbon dioxide intake of apple leaves as affected by reducing the available soil water to different levels.  
*Proc. Amer. Soc. hort. Sci. for 1943, 1943, 42: 133-40, bibl. 9.*

Apple trees growing in a greenhouse did not show a reduction in apparent photosynthesis until more than four-fifths of the available soil water had been utilized. No reduction in the rate of carbon dioxide assimilation occurred until the available soil moisture reached 10% or about 3% above wilting point and a week before wilting occurred. Trees that removed four-fifths and all the available water before watering, though showing no reduced CO<sub>2</sub> intake, utilized considerably less water and grew less than trees utilizing lesser quantities of water before more water was applied, possibly as a result of a loss of cell turgor.

63. PIENIAZEK, S. A. 634.11: 581.13  
Maturity of apple fruits in relation to the rate of transpiration.  
*Proc. Amer. Soc. hort. Sci. for 1943, 1943, 42: 231-7, bibl. 5.*

Transpiration of apple fruits is very high early in the season, decreases with the rapid decrease of permeability of the skin to water vapour and is at its minimum shortly before picking maturity. After picking maturity the rate of transpiration rises, especially when over mature.

64. BURGOS, J. J. 634.1/2: 581.055  
La influencia del invierno sobre los frutos de hojas caducas. (Influence of winter on deciduous fruit trees.)  
*Alm. Minist. Agric., B. Aires, 1943, 18: 345-8, bibl. 5.*

Apples and pears are most susceptible to lack of cold during winter and will only grow successfully in certain of the colder districts of Argentina, which are named. The apples Winter Banana and King David and Bartlett pear are, however, less exacting. The effect of insufficient cold may be a premature opening of the terminal buds which may cause those lower down the shoot to remain dormant all the spring. Stone fruits which flower before the leaves appear have less need of a cold spell and are consequently grown commercially in warmer districts, but if unseasonable warmth brings these trees into flower too long before the leaves emerge, food reserves are used up before the leaves can manufacture more, resulting in debility which leads to premature fruit drop. In such conditions, too, plums and damsons especially are liable to shed their floral buds. The amount of cold for normal bud opening is not constant for any one variety but varies with the locality in which the individual has lived. For example the peach May Flower grown in Dolores, a province of Buenos Aires, requires more cold for normal flowering than one grown near Catamarca. The unnatural dormancy caused by warm winters can be reduced if the trees are only pruned lightly so as not to produce strong wood, or dormancy may be broken by spraying with 10% solution of nitrate of soda with a trace of caustic potash, or with 5% linseed or mineral oil emulsion. The addition of 3% of dinitro-o-cyclohexi-phenol will break dormancy in 4 weeks. Indirect methods lie in procuring varieties from countries with warm winters. Also there have arisen in Argentina regional forms which are resistant to warm winters, such as the peaches Fiume and Ceibo and the plums, peaches and apple from the Andean provinces. The plant breeding stations of U.S.A. have produced peaches of similar resistant qualities,

namely Babcock, Rosy, Golden State, Ramona, Hermosa and Sunglow.

65. (GROSS, E.) 634.1/2-2.111  
Untersuchungen über den Einfluss von Kältebehandlung bei einigen Obstarten. (The influence of cold treatment upon flowering of some fruit trees.)  
*Gartenbauwiss., 1943, 17: 295-303, bibl. 5 from abstract Schweiz. Z. Obst- u. Weinb., 1943, 52: 522.*

Trials on the effect of cold on flowering in fruit trees were held at Eisgrub Fruit Experiment Station. Cherry, apricot and pear branches cut before and after incidence of natural frost were exposed to various degrees of frost for different periods. Preliminary results indicate that the date of flowering can be influenced by cold treatment. The treatment hastened flowering of cherries—there were varietal differences—whereas apricots were checked. The pear variety under trial flowered earlier when not treated.

66. BLAKE, M. A. 634.25: 581.145  
Classification of fruit bud development on peaches and nectarines and its significance in cultural practice.  
*Bull. N. J. agric. Exp. Stat. 706, 1943, pp. 24.*

The principal objective of this investigation, carried out at New Brunswick, was to establish a standard for the evaluation of the typical bud set of peach and nectarine varieties. Studies over a period of years showed that 12 in. terminal annual growths around the perimeter of the top of a tree 5-7 feet above the ground serve well as the desired representative unit. For young trees of 3-5 years a length of 18 in. may be more suitable, whilst for old trees shorter twig lengths may be preferable. The fruit bud set per foot on 171 peach and nectarine varieties is listed in a table which provides the material for grouping the varieties in 5 classes:—(1) exceptional—30 to 40 buds per foot; (2) good—20 to 29; (3) medium—15 to 19; (4) light—10 to 14; (5) poor—below 10. Since all factors affecting the growth of trees influence also the concentration of fruit bud set, the latter may be regarded as a valuable indication of tree condition. The effect of a number of environmental factors on bud set is discussed. Growers should evaluate the basic reproductive qualities in selecting a variety just as they consider size, colour and quality of the fruit.

67. UPSHALL, W. H. 634.25-1.55  
Increase in quantity, grade and returns from peaches as they approach optimum maturity.  
*Sci. Agric., 1943, 23: 747-50, bibl. 3.*

Measurements of peaches at Vineland Station, Ontario, showed an increase in tonnage in the case of Veteran and Elberta of 20% and 18% respectively and in the case of Golden Jubilee in 1941 of 41% during the week before optimum maturity. A colour chart helps to identify this stage which is reached when the green ground colour disappears or nearly disappears. During the same period the fruits improve in grade to an even greater extent. Peaches picked at the optimum maturity stage are still fit to be packed and shipped if carefully handled. Fruits left on the tree after optimum maturity for another 4 days up to a third colour stage gained a further 7-10% in weight. Such peaches are suitable for local marketing. Under normal weather conditions losses from dropping before the optimum maturity stage were negligible. A reproduction is given of the colour chart in question.

68. BRYNER, W. 631.55: 634.21 + 634.23  
Starker Früchtefall bei Aprikosen und Schattenmorellen. (Severe fruit drop in apricots and morello cherries.)  
*Schweiz. Z. Obst- u. Weinb., 1943, 52: 445-7.*

Following observations that apricots growing in dry localities did not shed their fruits in contrast to well-watered trees, watering of apricots was stopped at Wädenswil. This



measure checked the serious trouble at once. Since trees, which matured their fruits fully, ceased to make growth, a complete fertilizer with nitrogen in excess had to be applied. Also liquid manure can be applied on healthy trees towards the end of the winter provided the soil is neither wet nor cold. Morello cherries trained as espaliers on wet and poor soils and making good growth often shed their fruits in June. Control measures recommended are:—(1) Applications of 200-300 g. per sq. metre of a complete fertilizer at the beginning of the growing season, and of small amounts of nitrogen in May and at the time of decreasing shoot growth. (2) Digging in of slag, etc., for drainage purposes. (3) Pruning should be reduced to a minimum. The 30-40 cm. long shoots should be tied horizontally and only leaders which are too old or grow too close to each other should be removed. (4) Where shedding is caused by self-sterility, as is often the case, re-grafting with an early, well-cropping, self-fertile variety will be necessary.

### Manuring and cultural practice

69. HIGGINS, B. B., WALTON, G. P., AND SKINNER, J. J. 634.25-2.111-1.84  
The effect of nitrogen fertilization on cold injury of peach trees.  
*Bull. Ga Exp. Stat.* 226, 1943, pp. 27.

Following observations that after the severe winter of 1927/28 blocks of peach trees, which received the highest applications of nitrogen, showed least cold injury, a fertilizer test with nitrogen as the principal variable was started at Georgia Experiment Station in 1929. The outstanding results of this long term trial were (1) to confirm the original observation that nitrogen applications increased the resistance to cold injury and (2) to demonstrate the lack of correlation between nitrogen fertilization and cold damage to flower buds, flowers or young fruits. The most marked drop in cold injury was produced by increasing the nitrogen from 4% to 8%, an indication that in this proportion the balance between nitrogen and other nutrients was approximately achieved. The significance of balanced fertilization was stressed by the finding that also phosphate and potash in the absence of nitrogen application reduced the susceptibility to cold injury as compared with no-fertilizer blocks. Supply of any element deficient in a particular soil may, therefore, be expected to increase cold resistance. Georgia soils are especially deficient in nitrogen. Chemical analyses showed that the condition of susceptibility was associated with a consistently lower nitrogen content and a generally higher content of ash and total sugar, but the difference appeared too small to affect the osmotic values or the freezing points of the cell sap materially. The authors suggest that either increased quantities of protoplasm and smaller vacuoles in cells of the cambium region or the characteristics of the proteins present or perhaps a combination of both factors produce higher resistance in trees-receiving a liberal nitrogen application. Neither fertilizer treatments nor cover crops influenced the dormancy period. The earlier leaf fall in no-fertilizer and no-nitrogen blocks observed in years above the normal of sunny days in autumn may be explained as an earlier saturation with carbohydrates. The time of nitrogen applications did not affect the results.

70. BATIER, L. P., MAGNESS, J. R., AND REGEIMBAL, L. O. 634.11-1.84  
Nitrogen intake of dormant apple trees at low temperatures.  
*Proc. Amer. Soc. hort. Sci.* for 1943, 1943, 42: 69-73, bibl. 6.

Appreciable nitrogen was absorbed both in nitrate and ammonium form and changed to organic forms in roots of dormant apple trees at a temperature of 32° F. Little nitrogen was translocated from the roots while the tree top was dormant. Rate of absorption was reduced when

initial nitrogen content of the roots was high as compared to rate of intake when it was low. Winter rainfall causes a downward leaching in open textured soils and late applications in autumn may cause considerable loss of this element. The nitrogen that does enter the roots, however, will be available for use when growth begins in spring.

71. FREAR, D. E. H., AND ANTHONY, R. D. 634.11-1.84  
The influence of date of sampling on the value of leaf weights and chemical analyses in nutrition experiments with apple trees.  
*Proc. Amer. Soc. hort. Sci.* for 1943, 1943, 42: 115-22, bibl. 1.

Correlation between air-dry leaf weights and nitrogen applications were highly significant provided the samples were taken in late summer, August to early October. Chemical analyses, however, are to be preferred when they can be undertaken. There was no apparent relation between green manure applications and either air-dry leaf weights or leaf nitrogen analyses.

72. HAMILTON, J. M., PALMITER, D. H., AND ANDERSON, L. C. 634.11-1.84  
Preliminary tests with uramon in foliage sprays as a means of regulating the nitrogen supply of apple trees.  
*Proc. Amer. Soc. hort. Sci.* for 1943, 1943, 42: 123-6, bibl. 1.

Preliminary studies suggest that non-protein organic nitrogen (urea) may be applied to apple trees without injury using ordinary spray tackle. In this way the nutritional status of the tree might be more closely controlled than by manure applications to the soil. For example it might be possible to apply nitrogen early in the season for growth and fruit set and yet to have a depletion of nitrogen in the autumn so as not to interfere with fruit colour. The quantities of urea found effective were very small,  $\frac{3}{4}$ -1 lb. of Uramon per 17-year-old tree, and were applied to the foliage with wettable sulphur, lime and arsenate of lead each at 3 lb. per 100 gal. water. Other nitrogen carriers similarly tested were Chilean nitrate, synthetic sodium and potassium nitrate. In most cases leaf injury was caused and ways of avoiding this are discussed, possibly by omission of the arsenical; cherries seemed singularly immune to injury. Sprayed nitrogen enters the leaf through the underside, a fact not considered when these tests were made.

73. SHAW, J. K. 634.11-1.87  
Hay mulches in apple orchards.  
*Proc. Amer. Soc. hort. Sci.* for 1943, 1943, 42: 30-2.

An application of 4-8 tons of poor hay as a mulch to orchard trees at Massachusetts Experiment Station improved appearance and yield of trees, though colour of fruit suffered. Reduced quantities of mulch might be preferable.

74. WANDER, I. W., AND GOURLEY, J. H. 634.11-1.87  
Effect of heavy mulch in an apple orchard upon several soil constituents and the mineral content of foliage and fruit.  
*Proc. Amer. Soc. hort. Sci.* for 1943, 1943, 42: 1-6, bibl. 11.

A heavy mulch of wheat straw applied in a ring beneath the drip of branches at Ohio Agricultural Experiment Station increased the amounts of potassium, calcium, magnesium, phosphorus and boron in the soil as compared with clean cultivation; potassium to the lowest depth (24 in.) and the other elements chiefly in the surface area. Mulching increased the potassium and phosphorus contents and decreased the calcium and magnesium contents of leaves and fruit. Boron was increased slightly in the leaves but not in the fruits.



75. BAKER, C. E. 634.11-1.87  
Further results on the effect of different mulching  
and fertilizer treatments upon the potassium  
content of apple leaves.  
*Proc. Amer. Soc. hort. Sci. for 1943, 1943, 42:*  
7-10, bibl. 2.
- Trees mulched with inorganic materials such as cinders or  
glass wool produced practically the same increases at  
Purdue University, Ind., as when mulched with straw,  
manure, sawdust or tobacco that are known to have con-  
siderable quantities of soluble potassium. This may be due  
to some physical factors in the inorganic materials that make  
the K present in the soil more readily available, or the  
conditions are rendered more favourable for the growth of  
roots in the soil, thus making a greater intake of K possible  
because of the greater area covered by the roots. Organic  
mulches may in addition increase the supply of readily  
available K by leaching during rains or by the decomposition  
of mulching material where it is in contact with the soil.
76. GARNER, H. V. 631.875  
Returning straw to the land: compost comparison.  
*Emr Stk. Breed., 1944, 58: 146.*
- Eight years' experiments at Rothamsted comparing the value  
of fertilizers only, fertilizers plus straw, and compost made  
with similar straw and fertilizers showed no benefit from the  
straw in the first year of application, with sugar beet,  
potatoes and barley, but a beneficial residual effect from the  
straw. The straw applied direct to the land gave better  
results than the same material previously composted. In  
another series 13 tons dung, 8 tons raw straw plus artificials,  
and 17 tons straw compost, all of equal nutrient value, were  
compared for 10 seasons. The straw plus artificials gave  
slightly better results than the dung, and much better  
results than the compost, with potatoes, barley and wheat.  
Thus in these experiments direct application of raw straw  
plus the requisite artificials proved better than compost  
as good as dung. The stockyard is still considered the best  
method of using straw where possible, however, for here it  
conserves valuable liquid manure. The need for further  
experiment is stressed. W.S.R.
77. SANNIKOV, V. S. 634.1/7-1.87+551.577  
Mulching and snow trapping in young orchards  
of the Cheliabinsk province. [Russian.]  
*Vestnik plodovo-jagodnye kul'tury, 1940, No. 5,*  
pp. 90-2.
- In the area of Cheliabinsk the rainfall is light and is lacking  
when it is most needed, the snowfall is also light; the snow  
melts quickly in the spring and is easily blown away by  
winds. The soil is devoid of structure and easily forms  
crusts. Under such conditions the conservation of snow  
and rainfall is important. Snow is trapped by setting up  
screens or shields consisting of reeds or rushes in bundles,  
brushwood, wooden laths, or ice slabs. They are placed  
according to the direction of the wind in such a way as to  
enable the greatest possible amount of snow to be accumu-  
lated, for which purpose they may also be arranged in  
zig-zags. Orchards inter-planted with currant or gooseberry  
bushes have been observed to retain the snow for a long  
time. Mulching is another method of conserving moisture.  
Paper, reeds, rushes, compost, and peat were all tried as  
mulches. It was observed that a light-coloured mulch  
caused the temperature of the soil at a depth of 10 to 15 cm.  
to be 2° or 3° C. lower than did a mulch of compost. The  
author recommends that a mulch be laid down in early spring  
in a layer 8 to 10 cm. deep and be removed when cessation of  
growth is required. He cites figures showing that mulching  
enables the young trees to make better use of artificial  
manures than trees not mulched, and that the apples are larger.
78. DAVISON, J. R. 634.1/7-1.67  
Fruit tree irrigation. On the Murrumbidgee  
irrigation area.  
*Agric. Gaz. N.S.W., 1943, 54: 363-6, 411-4.*
- A number of factors influencing irrigation practice in

orchards of the Murrumbidgee irrigation area, New South  
Wales, are discussed. Rain, it is said, must be regarded as  
so much more beneficial than irrigation, because of the moist  
atmosphere associated with the former and the consequent  
reduction in transpiration. But nothing less than a 2 in.  
rainfall should be allowed to displace irrigation, except with  
more permeable soil types on slack grades where there is a  
danger of applying too much. In such a case it is advisable  
to wait until the soil has dried out, if it is hard to apply less  
than 2 in. of water. The extent to which penetration is  
affected by cultural practice is demonstrated in the following  
observation:—A block in an orchard was watered at right  
angles to the usual direction, and the penetration in the old  
"bone" was nearly four times as great as in the old run.  
The effect of soil on penetration is evident from a test  
carried out in an experimental orchard of the soil type  
Griffith loam or a poor Griffith clay loam. An even cover  
of 3 in. of water was applied over the whole of the grove.  
The lighter soil showed free water for no more than about  
6 hours, whereas the stiffer parts of the block were wet for  
up to 60 hours. The resultant penetrations after 3 days  
were 40 in. in the loam and 12 in. in the clay. If a tree wilts  
during heat waves despite the fact that there is sufficient  
moisture in the root zone, it shows that the root system is  
not equal to the demands of the top. This condition will  
occur with stone fruits at harvest time and makes it advisable  
on this occasion only to apply a light irrigation before the  
soil is dry. A balanced tree with a reserve of roots should  
be the aim. To achieve this it is essential not to force the  
young tree by injudicious watering. From the time of  
planting the root zone should be kept above wilting point,  
but not at "capacity". During the first year or two only  
the actual root area should be watered, preferably by drawing  
a single furrow down each side of the tree in the water-run  
and by connecting across by shovel so as to form a square  
with the tree as centre. This square should be kept weed-  
free and mulched. Cover-cropping the bay between the  
trees with early sown clovers from the time of planting  
onward is recommended. The working of the soil auger  
for finding penetration rates is explained and methods for  
making broad-based furrows are described. The article  
is helpfully illustrated.

79. McGRATH, J. V. 634.11-1.542  
Pruning the Delicious apple.  
*Agric. Gaz. N.S.W., 1943, 54: 329-31.*
- Delicious apples produced in the fruit-growing districts of  
Orange, Batlow and Amidab are stated to be superior to  
fruits grown anywhere else in New South Wales. Instruc-  
tions for the pruning of this popular variety are given.
80. SPRENG, H. 634.1/2-1.542  
Neuzeitliche Kronenpflege der Obstbäume nach  
Methode Oeschberg. (The Oeschberg method  
of pruning fruit trees.)  
*Dtsch. Obstbau, 1942, 57: 25, from abstract*  
*Forschungsdienst, 1943, Vol. 15, abstr. p. 69.*
- The author has evolved the so-called Oeschberg method of  
pruning fruit trees, said to result in uniform bearing all over  
the tree. Leaders are pruned to an outward bud, the inner  
buds being removed at winter pruning. The main differ-  
ences from usual German methods are:—(1) restriction to  
4 leader branches per branch series; (2) strict subordination  
of fruit branches; (3) distance from first to second branch  
series 1.50-3 m. Instructions are given for the transforma-  
tion of bearing trees to the Oeschberg system.
81. MONAŠOV, G. I. 634.11-2.111-1.541.1  
A horizontally-growing apple tree. [Russian.]  
*Vestnik plodovo-jagodnye kul'tury, 1940, No. 5,*  
p. 110.
- The growing of fruit trees in the horizontal position involves  
much labour. The trees, having been planted at an angle  
of 45°, are bent downwards and the branches held horizon-  
tally by pegs, wrapped with soft material to avoid damage



to the tree, and driven into the ground. Pegging must be attended to throughout the life of the tree, for new branches always grow upwards. In order to avoid this labour, trees with a horizontal habit of growth have always been desired and sought, and three 10-year-old apple trees, growing at a State farm near the town of Obojan', Kursk province, which appear to fulfil this desire, have been found. They are cultivated trees of unknown origin; the main and subsidiary branches, as well as the one-year-old shoots, grow horizontally; the leading branches are also so inclined. The trees are of the Ganché form, and the trunks 65 to 70 cm high. The crowns are round and umbrella-shaped with the branches drooping at the periphery. A little vertical growth of branches occurs only where there is overcrowding. The fruit when seen in August was large and round, being of a dark red streaky colour, and shows the trees to be late autumn- or even winter-bearing. If such trees be allowed to develop stems no higher than 10 to 12 cm. they would grow horizontally without the need for pegging.

82. HEL'FANDEIN, P. S. 634.11-1.546  
The formation of the crown on apple-trees grown in the Urals. [Russian.]  
*Vestnik plodovo-jagodnye kul'tury*, 1940, No. 5, pp. 21-32.

The shortcomings of the usual method of forming a crown are that little choice is left in determining the disposition of the branches, and that about half of the first year's growth is wasted when the main stem is cut back, only the weakest buds being left from which the main branches of the young nursery tree are to be developed. An experiment, begun in 1937, with several apple varieties grafted on Siberian crab, which was raised from seed sown in 1934, set out to discover a means of overcoming the shortcomings referred to, and proved that it was possible, by pinching off in the first and second growing seasons the appropriate green shoots, to encourage the early development of branches, and to produce a two-year-old tree having a crown consisting of about 4 well-spaced branches, and having all the virtues of a tree trained on the modified leader system. By thus producing a complete crown so much sooner than usual the difficult and lengthy process of training and pruning, which is, as a rule, involved, is to a considerable extent avoided, and fruit bearing, it is believed, should be hastened in consequence; for whereas a two-year-old tree has branches consisting of one year's growth, the skeleton branches which result from the procedure described have two-year-old wood.

83. MURNEEK, A. E. 634.11-1.542.24  
Effects of branch ringing on biennial bearing of York and Golden Delicious apples.  
*Proc. Amer. Soc. hort. Sci. for 1943, 1943, 42:* 163-6, bibl. 5.

When fruit setting is prevented by artificial destruction of blossoms, bark ringing becomes an effective procedure for induction of flower buds. The operation should be performed about 2 weeks after the destruction of the blossoms by spraying. Ringing alone in the on year is likely to be of value in causing bearing in the off year only if the fruit is heavily thinned in the on year, the trees are vigorous and the ringing is performed at the right time, the successful date in these experiments being 41 days after full bloom. No flower buds were formed when ringing was done 64 days after full bloom.

84. HODGSON, R. W., AND MOORE, P. W. 634.16-1.542.24  
Fruit thinning experiments with the loquat.  
*Proc. Amer. Soc. hort. Sci. for 1943, 1943, 42:* 187-92, bibl. 1.

Experiments with several varieties of loquat over a number of years show that the loquat is a pronounced alternate bearer in which large crops are associated with small fruit size and that fruit size is determined by the number and

weight of fruit of the preceding crop and the leaf area per fruit in the current crop. Alternate bearing can be controlled to a great extent by the thinning of flower or fruit clusters or the fruit and the increase is proportional to the per cent. of flowers and fruits removed. Thinning is less effective in the off-crop phase.

85. HITCHCOCK, A. E., AND ZIMMERMAN, P. W. 577.15.04: 634.1/2: 581.144/5  
Summer sprays with potassium  $\alpha$ -naphthaleneacetate retard opening of buds on fruit trees.  
*Proc. Amer. Soc. hort. Sci. for 1943, 1943, 42:* 141-5, bibl. 3.

Potassium  $\alpha$ -naphthaleneacetate (KNA) applied as a spray in concentrations of 200, 400 and 800 mg./l. in July, August and September retarded bud opening the following spring up to 14 days for flower and 19 days for vegetative buds, depending on concentration of KNA, time of application and variety of fruit.

86. CHILDS, L., AND BROWN, G. G. 634.11-2.951.8-1.55  
Tar oil spray as an agent in changing the alternate bearing habit of the Newton apple.  
Reprinted from the *Thirty-fourth Annual Report of the Oregon State Horticultural Society*, 1942, pp. 21-34.

In continuation of previous work on hand thinning of Newton apple, with the aim of changing the alternate bearing habit of that variety, tar oil sprays as a means of destroying part of the blossom were tested at the Hood River Branch, Oregon Experiment Station. Preliminary experiments on 40-year-old trees showed that very promising results could be obtained with "spot spraying", i.e. drenching alternate branches analogous to the previously developed "bulk thinning". This method was superior to drenching the whole tree, drenching one half or giving a mist type of cover. Tar oil at a concentration of 1% or 2% applied when the tree was 10% in blossom had a devastating effect on the young foliage, but the trees recovered fully a few weeks after spraying. It is estimated that thinning costs will be reduced by as much as 30-50%, if this operation is carried out by spraying in spite of the fact that the trees have to be thinned by hand every second year. Growers who had given "spot spraying" with tar oil a trial in their Newton plots found the bearing habit satisfactorily changed.

87. HOWLETT, F. S. 634.11-1.55: 632.95  
Di-nitro compounds employed as sprays to reduce fruit set in the apple.  
*Proc. Amer. Soc. hort. Sci. for 1943, 1943, 42:* 151-8, bibl. 3.

The problem of obtaining sprays for reduction or prevention of a fruit crop is complex. Each variety seems to react differently to a given concentration of the spray compound and the amount of injury is influenced by environmental factors, such as air temperature and relative humidity before or after spraying, and by factors such as influence vigour. These seasonal influences may account for differences in results obtained by various workers, and some of these differences are discussed in the light of the author's own results. Sodium di-nitro-cresylate, di-nitro-ortho-cyclo-hexyl-phenol and di-nitro-ortho-cresol were effective, the two last also when applied in oil emulsions. The results obtained are tabulated. The lines on which further work should proceed are indicated.

88. SCHNEIDER, G. W., AND ENZIE, J. V. 634.11-1.55: 632.95  
The effect of certain chemicals on the fruit set of the apple.  
*Proc. Amer. Soc. hort. Sci. for 1943, 1943, 42:* 167-76, bibl. 6.

Elgetol (said to contain the sodium salt of di-nitro-ortho-cresol and a penetrating agent), liquid lime-sulphur followed



by summer oil, and most of the bordeaux spray combinations applied during blossoming had little effect on the tree or the fruit crop of apples. Bordeaux 6-4-100 +2% summer oil, however, definitely reduced set and crop, as did the tar oil product Reico, di-nitro-ortho-cyclo-hexyl-phenol, di-nitro-ortho-cresol, naphthaleneacetic acid and naphthaleneacetamide, generally, though not always, without injury to the tree. The varieties used in the experiment were Delicious, Gano and Arkansas Black, though all did not receive identical treatment. Indoleacetic acid and levuline gave no definite response except that the former seems to have increased the percentage of flowering points that matured fruit in the case of Gano. The trees were growing in the New Mexico State College orchards.

89. MURNEEK, A. E. 634.11-1.55: 632.95  
Caustic sprays to modify alternate fruit production.  
*Proc. Amer. Soc. hort. Sci. for 1943, 1943, 42:*  
177-81, bibl. 5.

Partial reduction of apple fruit set may be obtained (for experimental purposes at any rate) by spraying in the late cluster bud stage with .5% concentration of creosote oil, tar oil distillate or dinitro phenol (one quarter dormant strength). A complete kill of bloom may be obtained by a 2% concentration of any of the above materials. A single spray seldom destroys all the bloom, nor does the prevention of cropping in the on year ensure a crop in the off year, especially on trees of low vigour.

90. HINRICHS, H., AND CROSS, F. B. 634.25: 581.144.2  
The relationship of compact subsoil to root distribution of peach trees.  
*Proc. Amer. Soc. hort. Sci. for 1943, 1943, 42:*  
33-8, bibl. 10.

Digging large holes and filling with topsoil improved the root growth of newly planted year-old peaches sufficiently to be economically worth while in cases where the subsoil was unsatisfactory.

## SMALL FRUITS, VINES AND NUTS

93. ROBERTS, O. C., AND COLBY, A. S. 634.711: 581.44  
Identification of certain red and purple raspberry varieties by means of primocanes.  
*Proc. Amer. Soc. hort. Sci. for 1943, 1943, 42:*  
457-62, bibl. 7.

The identification of red and purple raspberries from the vegetative characters of the first canes is entirely feasible and since plantings often contain rogues should prove useful. In this paper the various indicative characters which can be observed without the use of a lens are studied.

94. COLLISON, R. C., AND SLATE, G. L. 634.711.2-1.84  
Fertilizer responses of black raspberries in Western New York in demonstration and experimental layouts.  
*Proc. Amer. Soc. hort. Sci. for 1943, 1943, 42:*  
463-6.

Nitrogen was the effective factor in increasing growth and yield of black raspberries on an already fertile soil at New York State Experiment Station, Geneva. Even the smallest applications were effective.

95. MORROW, E. B. 634.73: 581.162.3  
Some effects of cross-pollination versus self-pollination in the cultivated blueberry.  
*Proc. Amer. Soc. hort. Sci. for 1943, 1943, 42:*  
469-72, bibl. 6.

Cross pollination in blueberry increases berry size by increasing the number of seeds and results in earlier ripening.

91. LINDEN, S. E. 634.1/7  
Den svenska fruktens försäljningsproblem. (The problem of selling and marketing Swedish fruit.)  
*Fruktodlaren, 1942, Nr. 6, pp. 177-82.*

The absence of imported fruit in the Swedish market has given a chance to growers which they did not enjoy in the face of foreign competition. The author urges that this opportunity should be used to raise Swedish fruit cultivation to the required standard. The most important step to be taken is the reduction of the almost infinite number of varieties by reworking old orchards and by laying out new plantations. The great losses in recent winters provide an additional stimulus to re-planning. In any given orchard the number of varieties should not amount to more than one-sixth of the number of trees. Preference should be given to late maturing varieties with good storage qualities. So-called Canadian boxes should be used for packing fancy fruit and marketing should be standardized by co-operation between growers' and wholesalers' organizations. Another of the author's demands is the extension of tariffs beyond 31 December of each year in order to protect also Swedish fruit released from storage. Finally, the establishment of a propaganda fund is suggested which should aim at raising the average yearly consumption from 20-25 kg. to 40-50 kg. per individual.

92. FEY, W., AND WIRTH, A. G. 634.1/2-1.546  
Der Spindelbusch eine Idealbaumform für den Garten des Selbstversorgers und für Erwerbsobstpflanzungen. (The pyramid bush an ideal tree shape for home gardens and commercial orchards.)  
E. Ulmer, Stuttgart, 1941, pp. 138, 3rd ed., RM. 2.50, *Grundr. u. Fortschr. i. Garten-u. Weinb., H. 58, from review Angew. Bot., 1943, 25: 305.*  
GREENE, L. 577.15.04: 634.11: 581.145  
Growth regulators and fruit set with Starking apples.  
*Proc. Amer. Soc. hort. Sci. for 1943, 1943, 42:*  
149-50, bibl. 4.

96. BECKWITH, C. S. 634.73  
Locating and preparing fields for the cultivated blueberry.  
*Circ. N. J. agric. Exp. Stat. 473, 1943, pp. 4.*

This circular was issued to meet the demand of New Jersey home gardeners and growers for information on the cultivated blueberry, *Vaccinium corymbosum*.

97. HANCOCK, W. G. 634.75  
Strawberries in North Queensland.  
*Qd agric. J., 1943, 57: 211-2.*

Useful information on the growing of strawberries in North Queensland with special reference to the selection of quality plants.

98. KOBEL, F., AND SCHÜTZ, F. 634.75-1.523  
Erdbeer-Neuzüchtung der Eidg. Versuchsanstalt Wädenswil. (A new strawberry variety of the Swiss Experimental Station, Wädenswil.)  
*Schweiz. Z. Obst- u. Weinb., 1943, 52: 483-5.*

The new strawberry variety Wädenswil III was bred at Wädenswil by crossing Wädenswil I as female parent with Hansa. It is a medium early variety with almost spherical, medium sized, dark red, sweet fruits which are very resistant to rain. The plants are fertile and long-lived, but susceptible to *Mycosphaerella fragariae*. Because of their vigorous growth, however, they do not suffer greatly from this disease. The fruits retain their quality and colour after freezing.



99. LATIMER, L. P. 634.75: 546.27

The response of strawberries to boron.

Proc. Amer. Soc. hort. Sci. for 1943, 1943, 42: 441-3, bibl. 5.

In Charlton loam soil at New Hampshire Experiment Station the addition of more than 5 lb. of boron or 25 lb. of borax per acre caused leaf injury to strawberries. Yield was only adversely affected in the plots receiving 80 lb. of borax per acre and over. No benefit in yield or runner production could be attributed to boron.

100. WEITZEL, A. 634.711-1.8

Düngungsfragen im Himbeeraanbau. (Manuring of raspberries.)

Dtsch. Obstb., 1942, 57: 50, from abstract Forschungsdienst, 1943, Vol. 15, abstr. p. 69.

Although the raspberry is deep rooted, most of the fibrous roots are at a depth of only 20-40 cm. Experiments showed that the plants need large amounts of humus and a fair amount of potash, and that fertilizers containing chloride or sodium chloride as well as over-doses of nitrogen promote the dying off of canes. Patent potash and potassium sulphate are beneficial.

101. KOBOZEV, V. V. 634.76-1.524(47)

A cranberry with large berries from the Turnhau region. [Russian.]

Vestnik plodovo-jagodnye kul'tury, 1940, No. 5, p. 76.

Among the three main species of cranberry, *Oxycoccus macrocarpus*, *O. microcarpus* and *O. palustris*, the first-mentioned from America, is the most valuable because of its large berries; but none of its varieties can withstand the cold climate of those parts of the U.S.S.R. where cranberries should most conveniently be grown. Though *O. palustris* can grow beyond the Arctic Circle its berries have hitherto been considered too small, a shortcoming which is shared with the third species, the yield of which is also too small. During the years 1936 to 1939, when cranberry bogs were being searched, new *O. palustris* varieties from the Jarcevski station were discovered with abnormally large fruit. The dimensions of the berries of three varieties are given and compared with the normal. It therefore seems that the ordinary European cranberry includes many forms, the berries of some of which compare favourably in size with those of the American species:

102. FRANKLIN, H. J., BERGMAN, H. F., AND STEVENS, N. E. 634.76: 551.56

Weather in cranberry culture.

Bull. Mass. agric. Exp. Stat. 402, 1943, pp. 91.

(1) BERGMAN, H. F.

The relation of ice and snow cover on winter-flooded cranberry bogs to vine injury from oxygen deficiency, pp. 3-24.

Massachusetts-produced cranberry crops have been considerably reduced by injury resulting from a lack of oxygen in the water during the winter-flooding period. The damage ranges from death of a portion of the stems with their leaves and buds to reduction of the size of mature fruits. Intermediate stages of severity are loss of leaves, dead terminal buds, dead flower buds, failure of flowers to set fruit and retardation in the development of flower buds. Extensive studies on the oxygen content of the water under an ice cover showed that the amount of dissolved oxygen present is determined by the rate of photosynthesis. If thickness of the ice, snow or cloudiness restrict this activity, the dissolved oxygen may be used up quickly by respiration of the vines, other plants and micro-organisms. Toxic substances formed in the process of breaking down the stored carbohydrates in the absence of sufficient dissolved oxygen may be partly responsible for the injury sustained. Flower buds and the leaves within terminal buds were found to be most susceptible to oxygen deficiency. The assumption that resistance to flooding injury is related to the amount of

carbohydrates stored is borne out by the observation that the damage is greatest after a large crop. Evidence indicates that a reduction of yield occurs if the dissolved oxygen content of the water falls below 3 c.c. per litre (4 p.p.m.) even for a few days, longer periods of deficiency causing further decrease. Two modifications of winter-flooding are suggested which have been successfully employed in Wisconsin: (1) freezing the vines into the ice; (2) flooding the bog as usual, and after several inches of ice have formed over the bog, drawing the water out from under the ice. In the first case the ice reduces respiration to almost nil; in the second case oxygen is abundant for the greatly reduced requirements, the temperature under the ice being much lower than in water under an ice cover. Furthermore, it is recommended that bogs should be flooded as shallowly and for as short a time as possible.

(2) FRANKLIN, H. J.

Cranberry ice, pp. 25-67.

This paper tries to cover all matters in cranberry culture involving the freezing of water. A great number of records were compiled, which present relevant data on the relation of weather factors to winter damage to cranberries over long periods, some of them for more than 70 years. To give an impression of the variety of subjects dealt with in this thorough investigation the table of contents is reproduced:—Winter ice—in the soil, on bog flowage, ice sanding. Hail damage—Massachusetts, New Jersey, Wisconsin. Winter-killing—Massachusetts, New Jersey, Wisconsin. Cranberry frosts—spring frosts, fall frosts, cranberry observing stations, minimum temperature formulas. Conditions related to frost occurrence on cranberry bogs and injury therefrom—pressure, cloudiness, wind, rainfall, mean temperature before frosts, dew, ground fog, bog resistance, vine growth, watching frosts, weather map, weather instruments, table showing temperature of dewpoint. Weather sequence and frost occurrence. Sunspots and vulcanism—Massachusetts, New Jersey, Wisconsin. Solar constant. Moon phases and frost occurrence. Bog protection from frost—bog surroundings, moss, fallen leaves, defrosting with water, chemicals, wind machines, cloth screens, smoke, heaters, sprinkling systems, re-sanding, flooding. Frost injury on Massachusetts bogs.

(3) STEVENS, N. E.

Relation of weather to the keeping quality of Massachusetts cranberries, pp. 68-83.

This paper was completed in 1935. The author states in a supplementary note that in the meantime the interest in the keeping quality of cranberries has somewhat slackened owing to the development of the canning industry.

(4) FRANKLIN, H. J.

Miscellanea, pp. 84-91.

Data are presented on the relation of sunshine, temperature and rainfall to size of cranberries, on cranberry size and keeping quality, size of berries and size of crops, weather and cranberry ripening and on late ripening and keeping quality.

103. WINGFIELD, J. 634.8

Growing vines out of doors.

J. roy. hort. Soc., 1943, 68: 375-7.

Consistently for many years the author has been able to grow heavily bearing grape vines out of doors in several counties of Southern England. Planting and pruning of vines, which are said not to require a particular amount of trouble, are described.

104. TIHONOV, N. N. 634.8

The vine in the Far East. [Russian.]

Vestnik plodovo-jagodnye kul'tury, 1940, No. 5, pp. 33-45.

Attempts at growing vines in the Far Eastern provinces of the Russian Empire were made in the latter years of the nineteenth century, but with little success; cuttings of neither European nor southern Russian varieties have been



able to succeed there. The use of the more hardy varieties from America and Canada seemed to offer better prospects. Many such varieties were therefore crossed with *Vitis amurensis*, found wild in many parts of far eastern Siberia, and the ensuing generations of seedlings raised by Michurin's methods. A description of the Amur vine, its botany and the uses of the fruit, as well as the promising results obtained from its hybridization with foreign varieties, is given in this article.

105. HARMON, F. N. 634.8-1.535: 577.15.04  
Influence of indolebutyric acid on rooting of grape cuttings.  
*Proc. Amer. Soc. hort. Sci. for 1943, 1943, 42:*  
383-8.

There was a great difference in response between vine varieties. Where results were favourable immersion of the basal ends of the cuttings for 24 hours in concentrations of 0.05% to 0.2% of the acid gave fairly uniformly beneficial results. Cuttings with a node at the base formed rather better conditions for rooting than internodal cuttings.

106. (KORDES, H.) 634.8-1.541: 577.15.04  
Wuchsstoffversuche an Reben. (Treatment of vines with growth substances.)  
"Wein u. Rebe" (no particulars), from abstract  
*Schweiz. Z. Obst- u. Weinb.*, 1943, 52: 565-6.

An account of H. Kordes' experiments on the treatment of vines with growth substances, carried out at the German Vine and Fruit Research Station, Neustadt a.d. Weinstrasse, 1937-41. A 0.0025% aqueous solution of  $\beta$ -indolylacetic acid stimulated root growth of cuttings. Further trials proved the beneficial effect of growth substances upon cuttings and buds of several European vines as well as upon American vine stocks and scions. In these trials, which showed the superiority of  $\beta$ -indolylbutyric acid and its potassium salt to all other substances tested, the long-dip treatment was employed. Treatment with the same two growth substances raised the success percentage of stock-scion union to 78.5 and 76.5 respectively as against 50 of water-treated controls. In this case the brush or short-dip treatment was employed using a much higher concentration than for the long-dip treatment. Large-scale experiments in the Palatinate, however, have shown that the long-dip treatment of stock and scion at low concentrations will also yield considerable success. Further experiments will have to determine whether the long-dip treatment both of stocks and scions cannot be replaced by short-dip treatment at a higher concentration. This would materially simplify the procedure, allowing the vines to be dipped in bundles into the solution directly before planting in the nursery.

107. TOENJES, W. 634.8-1.541.11  
Influence of some rootstocks on the Campbell Early grape.  
*Quart. Bull. Mich. agric. Exp. Stat.*, 1943, 26: 3-10.

Attempts were made at East Lansing to render the desirable Campbell grape less exacting in its soil requirements by grafting it on certain vigorous rootstocks. On a soil of medium fertility all grafted plants produced a heavier crop than own-rooted vines of the variety, but *Riparia*  $\times$  *Rupestris* 3306 was superior to all other stocks. These findings should make the growing of Campbell Earlies a commercial proposition on a large variety of soils.

108. OLMO, H. P. 634.851: 581.162.3  
Pollination of the Almeria grape.  
*Proc. Amer. Soc. hort. Sci. for 1943, 1943, 42:*  
401-6, bibl. 10.

The Almeria grape requires cross-pollination. A brief account is given of the artificial cross-pollination methods considered necessary in Spain. Experiments in California indicate that adequate natural cross-pollination can be effected by the wind and possibly by bees when conditions

are such as to permit of this. Various fruiting varieties of *vinifera* have been found suitable as pollinators. In view of the success thus achieved with Almeria it is questionable whether otherwise good *vinifera* varieties should be discarded or not tried commercially, as is now the case in California, simply because they are female and require cross-pollination.

109. ECHEVERRIA, J. 634.8-1.547.6  
III. Contribución al estudio de la madurez de algunas variedades de uvas. (Notes on the maturity of some grape varieties.)  
*Rev. Fac. Agron., Montevideo*, 1942, No. 29,  
pp. 85-9, bibl. 3.

Analyses of the mature fruit of 9 varieties of grapes grown in Uruguay and notes in which the results are briefly discussed.

110. LOOMIS, N. H. 634.848-1.542  
The influence of time and method of pruning on yields of Muscadine grapes.  
*Proc. Amer. Soc. hort. Sci. for 1943, 1943, 42:*  
418-20, bibl. 6.

SINGH, L., AND SINGH, S. 634.851  
Grapevine varieties at Lyallpur.  
*Ind. Fmg.*, 1942, 3: 372-5.  
112 varieties.

ZULAUF, H. 634.8-1.546.3  
Das Rebspalier. Anleitung zur Anpflanzung und Pflege der Rebe am Haus und im Garten. (The vine espalier. Instructions for the planting and cultivation of vines on house walls and in the garden.)

Witz & Co., Aarau, 1942, pp. 80, Fr. 2.80, from review *Forschungsdienst*, 1943, Vol. 15, abstr. p. 58.

111. KALAŠNIKOV, V. M. 634.5-1.524  
Nut-bearing species of the Far East. [Russian.]  
*Vestnik plodovo-jagodnye kul'tury*, 1940, No. 5,  
pp. 60-8.

The botanical characteristics are described of three species of nut found growing in the Far East. The species are:—*Juglans mandshurica*, *Corylus heterophylla*, and *Corylus mandshurica*. Special attention is given to the variability displayed by each of these species, notably, by the nuts of *Juglans*, and by the leaves and outer covering of the nut of the *Corylus* spp. Several sub-species of each have been identified. It is believed that all three species may prove useful to the plant breeder.

112. BRYNER, W. 634.51-1.541  
Über das Veredeln von Nussbäumen. (Walnut grafting.)  
*Schweiz. Z. Obst- u. Weinb.*, 1943, 52: 485-90.

All attempts to bud or graft walnuts in Switzerland having failed so far, the problem was studied at Wädenswil. In April 1938 scions from the imported varieties Mayette and Franquette were grafted on 2-year-old seedlings of *Juglans regia* and *J. cinerea* in the greenhouse. The plants were kept at a temperature of 24° C., which was lowered after 4 weeks, before planting out between the end of May and the end of June. Outside, the plants were well shaded and kept moist. About 80% of the grafts took, a success which it was not found possible to repeat in later years in spite of apparently identical conditions. However, the trials showed that strong scions with well-developed buds should be taken from young trees cut back severely. The method of grafting being of secondary importance, the one which will lead to the stock forming a union in the shortest time should be chosen. All attempts to bud or graft walnuts in the open were unsuccessful. Observations showed that a close relation exists between temperature and the time required

by a grafted scion to start growing and the rate of its growth. This observation explains also why grafts on the crown took so much better than those near the root collar. Temperatures on 5 March, 1938, for instance, at 5-6 cm., 1 m., 2 m. and 3 m. above the ground read 1-7°, 1-8°, 4-6° and 4-8° C. respectively. Reworking younger walnut trees is best done during the period end of May to June. The scions must be taken shortly before the swelling of the buds and stored just above freezing point. Saddle grafting underneath the bark on limbs not less than 4 cm. thick is thought to be the most suitable method. Further recommendations are that the scion should be covered with grafting wax and that not too many shoots should be left on the stock. It takes about 2 years longer to raise walnuts from stocks than to raise them from seedlings.

113. GOSSARD, A. C. 634.521: 581.192  
A study of methods of sampling pecan leaves for total nitrogen analysis.  
*Proc. Amer. Soc. hort. Sci. for 1943, 1943, 42: 109-14, bibl. 9.*

Leaflets stripped from the rachis were found to be the most convenient material, yielding highly accurate results as measured by low coefficients of variation. Percentage of total nitrogen on a dry leaf basis gave more consistent results than milligrams of nitrogen per leaf, being less affected by variations of leaf size. Differences as small as 3% of the mean can be measured accurately by the method and can be considered highly significant.

114. LOUSTALOT, A. J. 634.521-1.542.24  
Effect of ringing the stem on photosynthesis, transpiration and respiration of pecan leaves.  
*Proc. Amer. Soc. hort. Sci. for 1943, 1943, 42: 127-32, bibl. 7.*

Two experiments were carried out on a 12-year-old pecan tree, variety Western, at the U.S. Department of Agriculture Pecan Field Station at Brownwood, Texas. The ring of bark,  $\frac{1}{4}$  in. wide, was removed from the branch supporting the test leaves, the wounds being immediately covered with grafting wax. A 50-75% reduction in photosynthesis and transpiration rates was observed within 2 days following treatment. At the end of 50 and 38 days in the respective experiments reduction of photosynthesis had increased while the effects on transpiration remained more or less stable. Respiration rate increased from 10% above normal a few hours after ringing to 34% in 4 days, and to 54% and 42% 38 and 39 days after ringing. The leaves fell from 1 to 2 months earlier on the ringed branches though they did not differ in appearance from those on unringed branches. It is suggested that the data may lead to the re-evaluation of some of the conclusions drawn from studies concerning leaf/fruit relationships which involve ringing experiments.

115. STONE, C. L., JONES, L. E., AND WHITEHOUSE, W. E. 634.574: 581.162.3  
Longevity of pistache pollen under various conditions of storage.  
*Proc. Amer. Soc. hort. Sci. for 1943, 42: 305-14, bibl. 23.*

## PLANT PROTECTION OF DECIDUOUS FRUITS

116. HADORN, C., AND WIESMANN, R. 632.1/9: 634.1/8  
17. Konferenz der Eidg. Versuchsanstalt für Obst-, Wein-, und Gartenbau in Wädenswil über Bekämpfung von Krankheiten und Schädlingen der Obstbäume. (17th conference of the Swiss Experiment Station, Wädenswil, on disease and pest control of fruit trees.)  
*Schweiz. Z. Obst- u. Weinb., 1943, 52: 156-250.*

(1) HADORN, C.  
Der Schorf und seine Bekämpfung. Bericht Nr. 3, Versuche im Jahre 1942. (Scab control. Report No. 3. Trials in 1942), pp. 156-71.

The results of scab control trials (see also *H.A.*, 12: 854) carried out on many well-known apple and pear varieties during 3 seasons in 8 different regions of Switzerland differing climatically from one another can be summarized as follows:—It is of paramount importance that the protective covering be renewed and restored by a rapid repetition of pre- and post-blossom sprays. The critical phase in scab control being round about blossom time, varieties susceptible to early infection such as Gravenstein, etc., should receive 2 pre-blossom and 2 post-blossom sprays at intervals of 10-14 days, since successful control of primary infections in spring is the best prophylactic against late scab. An addition of 0.15-0.2% copper oxychloride to the 32° Bé lime-sulphur mixture increased both the efficacy and the duration of the protective covering effect; generally, however, the copper oxychloride addition did not permit of omitting one of the sprays at blossom time. "Maximal with copper" (cf. *Flugschr. Versuchsanst. Obst- Wein- u. Gartenb. Wädenswil*, 3/4, 1941) scored the highest success of all spraying programmes tested, giving good results even under most unfavourable climatic conditions, but "Normal without copper" and "Normal with copper" proved satisfactory for practical purposes. Pomarsol, which gave excellent scab control, has the great advantage that the effective principle goes into solution, but it does not control red spider. When this pest occurs lime-sulphur should be used thoroughly for the pre-blossom and, if necessary, calyx applications, followed by Pomarsol a fortnight after

flowering and in later sprays to control fruit worms. The duration of its effect being too short Pomarsol was found to be not yet suitable for applications at long intervals, for instance against late scab. Investigations on reservoir sprays are in progress.

- (2) WIESMANN, R.  
Weitere Versuche mit Gesarol im Obstbau.  
(Further trials with Gesarol in fruit growing), pp. 171-204, bibl. 7.

Gesarol contains a rather complicated chlorous hydrocarbon as its active agent in the form of fine crystals. It is very stable, resistant to light and not soluble in water. Its toxicity to insects is superior to that of rotenone and pyrethrin, though, at the concentrations employed, it is harmless to warm-blooded animals and even to earthworms, snails and fish. Contact of the insect with the agent has a paralyzing effect leading to its destruction. Disadvantages of the new preparation are that the lime-sulphur mixture has to be stirred continually as Gesarol does not remain suspended, and that it causes some flocculation in the mixture. Furthermore, its spreading and sticking capacities leave room for improvement. If these defects can be remedied the author expects on the grounds of his experiments with a great variety of fruit tree and berry pests that the application of arsenic in fruit growing will shortly be obsolete. Gesarol is not only a complete substitute for arsenic in the control of insects such as all maggot pests—including fruit worm—plum tortrix and plum sawfly, but can be employed successfully against some so far hardly controllable pests such as apple blossom weevil, cockchafer, raspberry beetle, strawberry weevil and others.

- (3) HADORN, C.  
Weitere Untersuchungen über die Vorratsspritzung. (Reservoir control of scab), pp. 204-17.  
The chemical side of the problem of reservoir control of scab and shot hole disease has not yet been solved (see also *H.A.*, 12: 855). The quantity of metallic copper necessary to provide protection against primary scab infection was found to be 0-1 g. dissolved in 100 litres as against 0-2 g. in the 1941 experiments.



- (4) HADORN, C. 632.21-2.19  
Untersuchungen über die Wirkungsweise verschiedener Spritzbeläge auf die Keimung der Sommer-sporen des Apfelschorfpilzes. Neue Grundlagen für die Bekämpfungsmassnahmen. (The effect of different spray covers on the germination of summer spores of the apple scab fungus), pp. 217-32.

Laboratory trials at Wädenswil indicated that a covering film provides the safest protection against scab irrespective of the chemical composition of the spray mixture used. Fineness as well as good floating, spreading and sticking capacity of the spray mixture are required to cover leaves and branches with a film. It is the floating capacity which makes for equal distribution of the effective agent. Only by spraying thoroughly, until leaves, fruits and branches are completely wetted, can a covering film be achieved. With spray mixtures which have only a limited spreading effect such as lime-sulphur + iron vitriol, lime-sulphur + copper oxychloride, copper carbonate and others, protection depends on the completeness of the covering film. With better spreaders such as Pomarol gaps in the interior of the tree are not so dangerous, since the dripping liquid will distribute the effective agent from leaf to leaf. A good covering film cannot be achieved by producing a fine mist of spray. The spray drops should crash or at least fall, but not just alight onto the leaves. On crashing the drops burst and spread their contents over an area, whilst the fine mist droplets hang onto the leaf hairs and spread only after prolonged spraying in the same direction. Experience showed that a pressure of 1-3 atmospheres at the nozzle and a nozzle aperture of 1.3-1.8 mm. made a rapid and equal distribution of the spray mixture possible.

- (5) WIESMANN, R. 632.23-2.19  
Neue Untersuchungen über die Bekämpfung der Kirschfliege *Rhagoletis cerasi* L. (Control of the cherry fruit fly), pp. 232-50.

Incidence of the cherry fruit fly in Switzerland began to increase again in 1942 after the pest had subsided for some years. Laboratory and outdoor tests in 3 regions indicated that the new insecticide Gesarol is very effective against it, but the qualifications mentioned under (2) hold good also in this connexion. It was found essential to treat all cherry trees in a certain district in order to eliminate the influx of fresh flies. The use of a 2% Gesarol mixture against cherry flies, instead of the normal 1% solution should be considered, since the insects lose their capacity to fly within 2 hours after contact with the spray covering at that concentration. Spraying should be done 8-10 days after the insects start flying. A method of trapping the flies to determine the spraying date is being evolved. Only very thorough spraying, to cover both top and lower sides of the leaves, will lead to successful control.

117. MÜHLE, E. 632.3/8  
Kartei für Pflanzenschutz und Schädlingsbekämpfung. (Card index for plant protection and pest and disease control.)  
S. Hirzel, Leipzig, 1942, 1st part, 42 cards, RM. 3.60, from review *Angew. Bot.*, 1943, 25: 307.

Ten to twelve parts in the form of a card index are planned for this work, which is to be kept up to date by addition of new cards and re-edition of individual cards when necessary. The index consists of (1) cards for the economic plants containing identification tables of their pests and diseases, (2) cards for the different pests and diseases containing data on incidence, importance, symptoms, biology and control as well as references to the literature, (3) cards giving a synopsis of similar or related pests and diseases and their differentiation and (4) reference cards to facilitate the finding of the main card. The reviewer considers that they should be particularly helpful for advisory work.

118. JIRAK, L. 634.21-2.19  
Über die enzymatischen Vorgänge des Welkens bei belaubten jungen Marillenbäumen. (Enzymatic processes concerned in the wilting of young leafy apricot trees.)  
*Gartenbauwiss.*, 1942, 17: 18-38, from abstract *Forschungsdienst*, 1943, Vol. 15, abstr. p. 37.

The dying of apricots, from so-called heatstroke or apoplexy, is described and figures are given for losses from this disorder which is of great importance in the Danube valley. The symptoms are wilting accompanied by gumming. The author, who has himself studied the enzymatic processes associated with the phenomena, also reviews the literature on the subject.

119. BROWN, D. S. 634.11-2.19  
Notes and observations from a study of water core in Illinois apples during the 1942 season.  
*Proc. Amer. Soc. hort. Sci. for 1943*, 1943, 42: 267-9, bibl. 3.

Water core of apples may be caused not so much by changes within the fruit as by something which occurs in the tree, in the spur or cluster base, which causes an influx of water and solutes into the apple, under pressure, with the resultant characteristic filling of the intercellular spaces of the fruit.

120. PROEBSTING, E. L., AND HANSEN, C. J. 634.21-2.19  
Leaf scorch and die-back of apricots.  
*Proc. Amer. Soc. hort. Sci. for 1943*, 1943, 42: 270-4, bibl. 1.

This condition in California is peculiar to apricots on myrobalan stocks. Trees which form scion roots or are inarched with seedling apricot regain their health.

121. MEIER, K. 634.23-2.19  
Untersuchung obstdaublich benützter Böden aus Kirchenbaugebieten der Kantone Aargau und Baselland. (Soil tests from cherry districts of the Aargau and Baselland cantons.)  
*Schweiz. Z. Obst- u. Weinb.*, 1943, 52: 424-42.

Soils from cherry orchards in the Aargau and Baselland cantons, which show a great number of trees suffering from a serious disorder, were exhaustively examined at the Wädenswil research station. The symptoms of the main trouble, previously described as Pfeiffingerkrankheit (*H.A.*, 1940, 10: 96), are severe gumming leading eventually to the death of the tree. Symptoms of similar disorders are weak growth, small yellow leaves, dying off of branches, etc. Although winter moth, shot-hole disease, frost and the physical conditions of heavy, badly aerated soils may have helped to weaken the trees in some cases, the real cause of the disorder was found to be deficiency, mainly of phosphoric acid, but also of potash and boron. Nitrogen was most probably deficient as well, especially under sod. Tests for potash often revealed a hardly appreciable deficiency, judging by the index figure, but it is believed that this figure (2.4 mg.  $K_2O$  per 100 g. soil, according to pH value) is too low to expect permanent good cropping. The deficiency of phosphoric acid was serious in the great majority of the 166 soils tested. Boron was deficient in 141 soils. 1,000 young cherry trees were planted for trial in two of the most affected places and given either a proprietary complete fertilizer, Lonzavolldünger, or a boron-containing nitrophosphate-potassium. Fertilizer experiments started recently seem to indicate that trees can be saved if treated in the initial stage of the disorder.

122. SCOTT, C. E., THOMAS, H. EARL, AND THOMAS, HAROLD E. 634.63-2.19: 546.27  
Boron deficiency in the olive.  
*Phytopathology*, 1943, 33: 933-42, bibl. 12.

Characteristic pitting of fruits, chlorosis of leaf tips, and dieback of shoots and branches of the olive were reduced or eliminated by treatment with borax or boric acid. Branch

injections, soil treatment, and spraying with boron compounds were all beneficial; but the effect of spraying on severely affected trees was transitory. Large trees responded to less than  $\frac{1}{2}$  lb. of borax broadcast on the soil in one district of Butte County, but seem to require about 1 lb. for complete cure. Four pounds per tree in the same soil did not cause discernible injury up to 6 months from the time of application. Observations and tests of boron deficiency in other crops in California are summarized. [Authors' summary.]

123. STROY, O. 634.1/2-2.111  
Efter vintern 1942/43. (After the winter of 1942/43.)

*Fruktodlaren*, 1943, Nr. 5, pp. 141-2.

During the winter of 1942/43 more fruit trees were killed and seriously damaged in western Scania than during the preceding 3 very cold winters. The following reasons are offered in explanation:—Growth started very late in the spring of 1942, thus shortening the growing period and weakening the trees which were, moreover, caught by early autumn frosts before the wood was fully matured. The spring of 1943 was unusually dry and windy, causing an abnormal loss of water in transpiration. The damaging effect of the spring weather conditions was borne out by the fact that younger trees pruned in February and March suffered much more severely than trees pruned in April. A heavy incidence of insect pests further aggravated the position. Among the cultural measures suggested to forestall frost damage is the thinning of heavily bearing trees and the early timing of summer pruning which will allow the tree to mature its wood.

124. RAMDAS, L. A. 632.111  
Cold waves and frosts.  
*Ind. Fmg.*, 1940, 1: 531-3.

The reason for and effects of cold waves and frosts in north and central India are discussed. The frosts are capable of causing severe damage to crops such as vines. Orchard heating by means of oil heaters is beyond the means of the average Indian farmer but it has been found possible to raise the temperature of a vineyard when protected by windbreaks by as much as 10° F. by using 400 cowdung plus litter fires per acre. The suggestion by Gujerat farmers that the extensive new irrigation in Sind was increasing the frost susceptibility of adjoining areas was investigated and shown to be unfounded.

125. (STRUNCK, R., AND WASCHNECK, A.) 634.1/2-2.111

Untersuchung über den Einfluss des Standortes und der Pflege auf die Frostschäden an Obstbäumen. (The effect of location and cultivation on frost damage to fruit trees.)

*Gartenbauwiss.* (undated), from abstract *Schweiz. Z. Obst- u. Weinb.*, 1943, 52: 494.

The influence of location, soil and cultivation on the amount of frost damage to fruit trees was studied in Saxony. The recommendations made refer to (a) Protection of existing orchards. Damage to blossoms by late frosts and total losses can be prevented by planting windbreaks, removal of plant strips which will make for cold air pockets and by creation of open water spaces. Irrigating should cease in late autumn and the soil should be well drained. Proper management with respect to manuring, cultivation and pest and disease control is of great importance. For reworking only frost-hardy varieties or such as will become so on a particular stem builder should be used. (b) New plantations. Damp localities and enclosed valleys as well as impermeable soils should be avoided even in first class fruitgrowing districts. In districts where frosts may occur valuable and susceptible varieties should not be grown in large commercial orchards but rather in sheltered gardens on suitable stembuilders or intermediates. In many cases preference should be given to bush trees or weak growing

stocks which finish their growth early. On low ground, however, where cold air is liable to remain standing, only standard trees may be planted whose stem and, if possible, crown must be formed by a frost-resistant variety.

126. RISCHKOV, V. L. 632.8  
The nature of ultra-viruses and their biological activity.

*Phytopathology*, 1943, 33: 950-5, bibl. 19.

The article is a report made at the session of the Academy of Sciences of the Ukrainian S.S.R. in January 1942 and gives an account of the virus research carried out by the author and his collaborators at the Institute of Microbiology of the U.S.S.R. Academy of Sciences. After briefly discussing the nature of ultra-viruses the effect of the virus on the protein, phosphorus, carbohydrate and nitrogen metabolism of the infected plant is indicated in 5 tables. No deficit in the protein fraction could be detected in the juice of tomatoes affected by mosaic. On the contrary, diseased plants, especially if grown under conditions of nitrogen and phosphorus starvation, may show an increase in inert non-virus protein as compared with healthy plants. The phosphorus metabolism was studied in tobacco plants. Lipid phosphorus did not show any significant changes in contrast to protein phosphorus, which increased in soluble proteins in case of mosaic and decreased in insoluble structural protein. The author concludes that an expenditure of structural nucleoproteins takes place in mosaic-affected plants. In order to obtain accurate figures for the changes in carbohydrate and nitrogen content leaves and leaf halves rubbed with the juice of a normal tobacco plant were compared with those rubbed with the juice of a plant infected by mosaic. The infected leaves showed a greater expenditure of carbohydrate but a much smaller loss of protein N compared with normal leaves. In an attempt to elucidate the biochemical activity of the virus it could be demonstrated that the virus of tobacco mosaic has the ability to liberate phosphoric acid from monophosphate of glucose. This finding would account for the activation of the carbohydrate metabolism and the disintegration of structural nucleoproteins of the protoplast. Studying the conditions under which the virus accumulates it was ascertained that accumulation ceases at 5° C. and proceeds much more slowly at 15° C. than at 20° C. The presence of 0.5 c.c. of ethyl ether per litre in the atmosphere does not affect the intensity of virus accumulation. In view of the injury sustained by the leaves no conclusive results could, so far, be obtained from exposure to higher concentrations and other gases, but M. W. Woods' results indicate that the accumulation of the virus depends on an oxidative system, reversibly inactivated by CN (*Science*, 1940, 91: 295-6). Finally, the belief is expressed that the application of T. Caspersen's method to a virus-infected cell (*Naturwiss.*, 1940, 28, Nos. 31-2) will help to throw light on the relation between protoplasm and virus.

127. CONDIT, I. J., AND HORNE, W. T. 634.37-2.8  
Mosaic spots of fig fruits.

*Phytopathology*, 1943, 33: 719-23, bibl. 4.

The spotting of certain caprifig seedlings fruiting at Riverside, California, is apparently the result of a mosaic disease rather narrowly restricted as to its host and somewhat peculiar in its expression. [From authors' summary.]

128. (WHITE, P. R.) 632.3+632.8  
Plant tumour bacteria.

*Science*, 1943, Vol. 98, No. 2537, Supplement p. 10.

Summarizes recent results obtained by Dr. P. R. White, Rockefeller Institute, Princeton, N.J., in his work on malignant tumours of plants. These tumours are started by bacteria, but, when transplanted to other subjects, the presence of the originally causative bacteria is not necessary to enable them to continue their malignant growth. The suggestion was made that the bacteria themselves do not cause the trouble but are the carriers of a virus which is



liberated and can then multiply without them. The Madagascar periwinkle, *Vinca rosea*, will stand prolonged exposure to 115° F., a temperature that will kill known plant viruses. Inoculated with tumour bacteria and held at this temperature for 10 days, nothing occurred, but when the temperature was lowered to an ordinary greenhouse temperature, the tumours developed normally. The bacteria had in some way bequeathed to the plant a heritage of abnormal growth.

129. FULLING, E. H. 632.452  
Plant life and the law of man. IV.\* Barberry,  
currant and gooseberry, and cedar control.  
*Bot. Rev.*, 1943, 9: 484-592, bibl. 411.

A history of legislation and litigation in the United States respecting eradication and quarantine of alternate hosts in the control of three heteroecious fungus diseases—black stem-rust of wheat, white pine blister-rust and apple rust.

130. COOLEY, J. S. 632.4: 634.1/7  
*Armillaria* root rot of fruit trees in the Eastern  
United States.  
*Phytopathology*, 1943, 33: 812-7, bibl. 8.

In surveys made by the Plant Industry Station, Beltsville, Md, stone fruit trees attacked by *Armillaria* were located in the Eastern United States only occasionally. Inoculations failed to reproduce the disease with few exceptions and it could not be ascertained whether the fungus is the initial cause of the decline of affected trees. Spread of the disease to surrounding trees was not observed either. It is suggested that the environmental conditions of the east favour resistance to *Armillaria*, whereas susceptibility in the dry climate of the west is high.

131. YOUNG, G. Y. 631.537: 632.4  
Root rots in storage of deciduous nursery stock  
and their control.  
*Phytopathology*, 1943, 33: 656-65.

Observations at local nurseries by the Mississippi Experiment Station show that much damage is caused to the roots of nursery stock by freezing injury which may occur in various ways during lifting, transit or in storage. In storage the injured roots were attacked by *Fusarium* and *Alternaria* spp. and much damaged. Certain recommendations were made with successful results. Stocks should only be lifted, with very few exceptions, when the temperature is above freezing point. Deep heeling in loamy soils is preferable to shingle tow, sawdust or coarse sand. Heeling in sites should be changed annually. Sheds or cellars with a temperature between 34° F. and 50° F. and a high relative humidity are suitable for storing most deciduous nursery stock. Nursery stock should not be put on rail for transit during freezing weather. In this connexion it is suggested that the Weather Bureau information would form a reliable guide.

132. WILKINSON, E. H. 634.11-2.4  
Perennial canker of apple trees in England.  
*Gdnrs' Chron.*, 1943, 114: 159, bibl. 5.

A canker and dieback of apple branches formerly attributed to *Gloeosporium fructigenum* (H.A., 12: 1316) is now shown to be caused by *G. perennans*, responsible for a serious disease in North America known as perennial canker and not hitherto reported from Great Britain. Only one serious outbreak has been reported, from Worcestershire, but there have been minor outbreaks in two other localities in Worcestershire and Somerset. The disease entered through pruning cuts during summer pruning; trees winter-pruned showed no infection. The substitution of winter for summer pruning and the removing and burning of all infected shoots in winter effected a complete cure and prevented further infection.

\* Parts I-II see *J.N.Y. Bot. Gdn.*, Sept. 1941 and Feb. and June 1942.

133. DENNIS, R. W. G. 634.11-2.4

A black rot of apples, new to Britain.

*Gdnrs' Chron.*, 1943, 114: 221, bibl. 2.

From the Plant Pathological Laboratory of the Department of Agriculture for Scotland comes a description of a black rot of apples not previously reported in Great Britain. The causal fungus is *Strasseria carpophila* Bres. and Sacc. The rot is differentiated from that caused during storage by *Sclerotinia fructigena* by the fact that the fruit attacked turns black before being picked. The fungus was first described from Lower Austria in 1902. In the example from Scotland it seems clear that *Strasseria carpophila* was secondary to *Botrytis cinerea*.

134. WILSON, E. E., AND SCOTT, C. E. 634.25-2.4  
Prevention of three peach diseases by ferric  
dimethyldithiocarbamate spray.  
*Phytopathology*, 1943, 33: 962-3.

Ferric dimethyldithiocarbamate (Fermate) was tested as a spray for control of 3 peach diseases in Sacramento Valley, Ca. In the case of brown rot caused by *Sclerotinia fructicola* incidence was reduced to 4% by application of Fermate 1-100 and 4 oz. of a wetting agent to 100 gal. as against unsprayed 19% and lime-sulphur+wetting agent 8%. Fermate was also successfully applied for the control of rust caused by *Tranzschelia prunispinosae* and of blight or shot-hole caused by *Coryneum beijerinckii*. In the case of rust effectiveness was increased by addition of lime, in the case of blight the results equalled those achieved with lime-sulphur 6-100 treatment and bordeaux mixture 10-10-100.

135. REID, R. D. 634.75-2.411  
Strawberry red core disease. A progress report.  
*Fruitgrower*, 1944, 97: 9, 29-30, bibl. 2.

The report deals with the experience of 5 Auchincruive strawberry varieties resistant to the red core root rot, which were released by the Department of Agriculture for Scotland in 1941, and with the newer varieties produced and tested since the first report. Although resistance to the red core disease caused by *Phytophthora fragariae* was reduced under the very unfavourable conditions of 1943, susceptibility of the Auchincruive varieties was much lower than that of other varieties. Scottish growers appear to be inclined further to increase Auchincruive plantations which now occupy more than 75% of the total area planted with strawberries in the west of Scotland. The American variety Aberdeen has continued to be immune to red core under Scottish conditions, but has shown a slight breakdown in America. The selection of red core resistant plants made in 1943 from a large batch of seedlings shows promise, particularly in respect of fruit quality, whereas breeding results of virus tolerant or resistant strains have been disappointing so far. The breeding and testing work is being continued.

136. FRIEDRICHSON, G. A., AND VERTOGADOVA, O. N. 634.711-2.42

A new disease of the raspberry-stem canker.  
[Russian.]

*Vestnik plodovo-jagodnye kul'tury*, 1940, No. 5, p. 112.

Up till 1937 the occurrence of stem canker (*Coniothyrium wernsdorffiae*) of the raspberry had not been recorded in the U.S.S.R. In that year an extensive attack of it was observed at a State farm in the province of Penza. The authors give a description of the disease, its appearance and progress. That moisture was a predominating factor in bringing out the disease was confirmed in 1938 and 1939. In two dry years it was to be seen only in the wetter parts of the plantation and where the foliage was comparatively dense. It was especially noticeable on the lower portion of the stems.

137. BOHART, R. M. 632.73  
Calcium cyanide fumigation for the western thrips.  
*J. econ. Ent.*, 1943, 36: 442-4.  
*Frankliniella occidentalis* larvae were much more resistant than adults to fumigation, but it was concluded that during heavy infestations a weekly or bi-weekly fumigation for 3 hours at a dosage of 0.75 oz. Cyanogas G-Fumigant per 1,000 cu. ft. in a reasonably tight greenhouse should give adequate control. In the case of overnight fumigation 0.5 oz. was sufficient.
138. CASTBERG, C. 632.753: 634.11  
Nya rön angående blodlusen. (New observations on woolly aphids.)  
*Växtskyddsnötiser*, 1941, Nr. 6, pp. 86-90.  
Examining woolly aphids during the severe winter 1940/41 in southern Sweden the author found that the older developmental stages were the first to be destroyed. At the end of the winter only the very youngest stages in especially sheltered places such as bark fissures, etc., protected by leaf remnants survived. This observation does not suggest that the young larvae migrate towards the older parts of the tree, but that they perish on more exposed younger branches. The lowest temperatures recorded in that region were  $-21.5^{\circ}\text{C}$ . at Lund, while night readings of  $-18^{\circ}\text{C}$ . were reported more often. The hard winter, however, did not produce a decline in woolly aphid incidence owing to their enormous reproductive capacity. It follows from these observations that the trees should be scraped carefully so as to offer no shelter to the pest. Spraying with 15% denatured alcohol, 0.75-1% green soap and 0.2% nicotine gave good results especially against small larvae on young growth. The author stresses the necessity for not confining the spraying to the actual colonies but for extending it also to the crown of the tree. The relative value of different spray mixtures seemed to be less important than thoroughness of spraying. The parasite *Aphelinus mali* imported from America spread well and withstood the cold, but does not show much promise as an effective control of the pest. The Plant Protection Station, Stockholm, has introduced an inspection service which sends officers to inspect nurseries and orchards in the neighbourhood of reported outbreaks.
139. MENZEL, R. 632.753: 634.8  
Reblausbekämpfung einst und jetzt. (*Phylloxera* control past and present.)  
*Schweiz. Z. Obst- u. Weinb.*, 1943, 52: 600-4.  
STEINEGGER, P. 632.753: 634.8  
Erfahrungen über die Reblausbekämpfung im Kanton Baselland. (Experiences gained in *Phylloxera* control in the canton of Baselland.)  
*Schweiz. Z. Obst- u. Weinb.*, 1943, 52: 604-10.  
A historical survey of *Phylloxera* control measures was given by Menzel at a conference on *Phylloxera* control held at Basle in September 1943. Of recent experiments it is reported that spraying with fruit tree carbolineum, especially 6% Veralin, gave promising results. Hybrids sprayed in March remained free from leaf galls up to the beginning of July, whereas untreated vines and vines washed with lysol showed severe infestation in May and June.  
In another lecture at the same conference Steinegger reported that failure to comply with regulations set down in 1940 resulted in an infestation with leaf galls of 24 out of 39 hybrid plots in the vineyard of Benken. New infestations in other vineyards are recorded. The following conclusions are drawn from experiments and observations:—(1) Cool and wet weather at the time of May gall formation is unfavourable to the development of young *Phylloxera*, whereas warm, sunny periods promote leaf galls. Low winter temperatures do not appear to be injurious to the winter eggs. (2) Winter treatment of the vines with any of the sprays known to date is deprecated in view of the fact that even 99% success is quite insufficient. (3) The new form of *Phylloxera* infested all the common American stocks in pot tests. So far, the stocks of *Riparia* and *Rupestris* crosses 3309, 101/14, *Riparia*-Grand-Glabre, Oberlin 595 and some others have proved particularly susceptible. (4) Although immune hybrids are not known, there are some which are less liable to leaf gall development. When incidence was heavy and weather conditions were favourable infestation of European vines producing stunted galls through young *Phylloxera* hatched from leaf galls have been observed. However, no cases have been reported where the first leaf gall generation, the so-called fundatrix, occurred on European vines. (5) Consistent grubbing and disinfection succeeded in suppressing *Phylloxera* infestation at Muttentz from 1938 to 1943. The author concludes that in the present state of affairs half-measures are no longer any good. He demands legislation ruling that (a) hybrid plantations with an incidence of leaf galls must be grubbed entirely, (b) planting of hybrids against house walls and in gardens within a radius of 10 km. from any plantation of European seedling vines shall be an offence, (c) in *Phylloxera* infested areas, where soil disinfection is not practicable, grubbed plots must not be used for vine growing for a period of 3 years.
140. BECKWITH, C. S. 634.73-2.7  
Insects attacking blueberry fruit.  
*Circ. N.J. agric. Exp. Stat.* 472, 1943, pp. 4.  
The circular deals with blueberry fruit fly, *Rhagoletis pomonella*, and cranberry fruit worm, *Mineola vaccinii*, at some length and with a number of other insects briefly.
141. AHLBERG, O. 632.76: 634.1/2  
Ökad skadegörelse av lövvedborren. (Increased damage from the shot hole borer.)  
*Växtskyddsnötiser*, 1942, Nr. 5, pp. 75-7.  
Following several cold winters damage from the shot hole borer (*Anisandrus dispar*) has been unusually great in Sweden during recent years. Thousands of fruit trees which would have recovered from minor frost injuries were subsequently killed through its activities. The Plant Protection Station, Stockholm, intends to experiment on control measures. Meanwhile the author suggests that the trees should be sprayed in spring with standard arsenic preparations at  $10\times$  the usual strength.
142. JANCKE, O. 634.13-2.76  
Weiterer Beitrag zur Lebensweise und Bekämpfung des Birnknospenstechers (*Anthonomus piri* Kollar). (Life history and control of the pear blossom weevil.)  
*Gartenbauwiss.*, 1942, 17: 1-17, from abstract *Forschungsdienst*, 15, abstr. p. 14.  
Pyrethrum and pyrethrum-derris preparations gave satisfactory control of the pear blossom weevil in the Palatinate, if applied during the last ten days of September, whereas dinitroorthocresol solutions were ineffective and caused leaf scorch.
143. VAN LEEUWEN, E. R. 632.78  
Chemotomic tests of materials added to standard codling moth bait.  
*J. econ. Ent.*, 1943, 36: 430-4, bibl. 5.  
Two hundred and fifty chemical compounds or mixtures are being tested as attractants to be used as a supplementary control in codling moth baits by the U.S.A. Bureau of Entomology. About 50 of the materials increased the attractiveness from 50% to 450% while a few decreased attractiveness. Pine-tar oil was one of the most promising.
144. STEINER, L. F., AND SUMMERLAND, S. A. 632.78  
Xanthone as an ovicide and larvicide for the codling moth.  
*J. econ. Ent.*, 1943, 36: 435-9, bibl. 3.  
The preparation consisting of xanthone 2 lb., kerosene 1 qt., soap 3 oz. (+2 oz. zinc sulphate for the fourth spray only)



per 100 gal. water was most effective against codling moth eggs deposited soon after the spray application in U.S.A., whereas nicotine sulphate 1-1,200 with mineral oil (0.75% and 0.5%) was most effective against eggs in the black-spot or advanced red-ring stage. Xanthone was more effective on foliage than on fruit, oil nicotine the reverse. As a larvicide in the laboratory-field tests it was less effective than oil-nicotine and lead arsenate-bordeaux combinations.

145. MARSHALL, G. E. 634.1/7-2.78  
The control of the oriental fruit moth by mechanical means.

*J. econ. Ent.*, 1943, 36: 468-9.

The mechanical method suggested is the clipping of infested twigs as a regular orchard practice. In the Indiana peach schedule for 1943 clipping enabled 5 of the 6 recommended sprays or dusts to be left out.

146. BRAID, K. W., AND CONWAY, E. 632.51  
Rate of growth of bracken.

*Nature*, 1943, 152: 750-1, bibl. 3.

A cultural experiment is described to show that the growth rate of bracken is not nearly so slow as until recently has been believed. A sporling, 2 to 3 inches across bearing 5 or 6 immature fronds, planted out on 29 March in good soil in a long narrow trough with moveable concrete sides, had by October developed 22 green fronds, a number of withered sporling ones and a large number of immature unexpanded fronds. The overall stretch of exploratory rhizome under ground was 85½ inches. Companion plants showed similar development. Growth was very considerable between August and October. Young sporophytes, so small as to be easily overlooked, could by July have formed plants 1-2 ft. across which might double themselves by October. Such clumps are often found in heather but until now the fact that they could be one season's growth was not recognized.

147. ANON. 634.1/7-2.693.2  
Damage by hares.

*Agric. Gaz. N.S.W.*, 1943, 54: 331.

During the winter of 1943 hares did considerable damage, particularly to the New England area, New South Wales. Where the trees cannot be protected by wire netting a mixture of the following ingredients boiled for 20 minutes should be applied:—1 oz. bitter aloes, 1 lb. common soap cut up fine, 1 gallon water.

148. LINDBLOM, A. 632.693.2  
Bekämpningsförsök mot vattensork. (Control of the water mole.)

*Växtskyddsnotiser*, 1941, Nr. 3, pp. 34-8.

Damage from moles has assumed serious proportions in some parts of Sweden, partly through the shooting of foxes and birds of prey. Of the control measures tested by the Plant Protection Station, Stockholm, such as trapping, gassing, poisoning and rat typhus, only the last showed some promise. The bait was prepared as follows:—To 0.75 kg. potatoes and 0.25 kg. carrots cooked and mashed 1 litre of bacterial culture (Ratin) and 0.5 kg. bread crusts in small cubes were added; 60 portions of 25 g. wrapped in newspaper were laid out as baits. Of these 35% were untouched, 48% had disappeared and 17% were eaten. In a second trial one month later the corresponding figures were 75%, 18%, 7%. It is concluded that the number of moles had decreased either through death or migration.

149. ANON. 634.1/2-2.95  
Fruit tree spraying chart—I and II.

*Publ. (out of series) Minist. Agric., Lond.*, 1943, pp. 1 each.

Coloured illustrations of apple, pear, plum and black currant buds picturing the various bud stages in which the different sprays should be applied.

150. WEBER, A. L., AND McLEAN, H. C.

634.11-2.95

Spray coverage of apple trees as affected by different methods of application.

*Proc. Amer. Soc. hort. Sci. for 1943*, 1943, 42: 285-8.

In a series of orchard tests by growers the so-called speed sprayer gave the best results. The speed sprayer contains up to 103 nozzles in the head end and deposits the spray in a very fine mist compared to that from spray guns and brooms. Its use reduces labour costs and it largely eliminates the personal factor.

151. VANIN, I. I., AND DRUŽKOV, N. N.

632.943: 634.1/7

New equipment for combating pests and diseases of fruit. [Russian.]

*Vestnik plodovo-jagodnye kul'tury*, 1940, No. 5, pp. 93-6.

The article contains a description of a dust sprayer for orchards, as well as for cotton, cereal and some other crops. The dusting apparatus is attached to the back of a tractor without additional wheel. The rate of dusting may be varied from 4-8 to 120 kg. per hectare. Tests show that the apparatus could throw the dust 10 to 12 metres in a cloud 3.5 to 4 or more metres wide, and that 29.5 to 23.6 ha. in 2nd gear and 42.5 to 34.9 ha. in 3rd gear could be dusted in 8 hours according as the number of trees per ha. was 100 or 156.

152. ANON. 632.95

Proprietary products for the control of plant pests and diseases.

*Agriculture*, 1943, 50: 331-4.

The Ministry of Agriculture and the Department of Agriculture for Scotland have launched a voluntary scheme for the official approval of insecticides and fungicides sold under trade names. Each container of an approved product will bear a diamond-shaped approval mark. A list of officially approved products will be issued periodically.

153. MILLER, H. J. 632.951

A comparison of laboratory and field retention and protective value of certain copper fungicides.

*Phytopathology*, 1943, 33: 899-909, bibl. 28, being *Pap. Pa. Agric. Exp. Stat.* 1132 (J. Ser.).

The retention of copper fungicides on Pyralin plates in the laboratory as compared with that on cherry leaves under natural spraying conditions was studied at Pennsylvania State College. The two values obtained were in good agreement with each other and with the determination of retention by the spore-germination technique. Bordeaux mixture and 2 tank-mix copper phosphate formulae were superior in retention to a number of commercial copper materials tested. There was, however, little correlation between retention of copper and fungicidal effect, the latter depending on the toxicity of the mixture expressed as LD 50. A significant correlation was established between control, tenacity index and LD 50. The percentage control was found to be normally distributed against the logarithm of the LD 50 values after the laboratory rain.

154. PALMITER, D. H., AND HAMILTON, J. M.

634.23-2.8

Organic materials in pre-harvest sprays for cherries.

*Phytopathology*, 1943, 33: 683-90, bibl. 4.

The organic materials Fermate (ferric-dimethyl-dithiocarbamate) and Jap Beetle Spray (tetra-methyl-thiuram-disulphide) showed two or three times greater toxicity against spores of brown rot of cherries (*Sclerotinia fructicola*) and grey mould (*Botrytis cinerea*) than Sperton (tetrachloro-para-benzoquinone) and micronized sulphur. The concentration used should be 1-100 and this strength would also give good leaf spot control. Fermate with a good spreader

as S.E.C. Oil,  $\frac{1}{2}$  pint, does not leave a visible residue on dark cherry varieties. On white varieties Fermate can be used up to the final pre-harvest spray, after which Jap Beetle Spray or wettable sulphur may be substituted to avoid the dark residue. Where frequent applications are necessary, as harvest approaches, Fermate  $\frac{1}{2}$ -100 might be used with success.

155. ARNOLD, H. C. 632.651  
Pyrethrum.

*Rhod. agric. J.*, 1943, 40: 218-22, 289-92.

The cultivation of pyrethrum is fully described with a view to assisting growers who may wish to experiment with the crop in S. Rhodesia. Trials at the Salisbury Experiment Station show that while pyrethrum can be grown under conditions widely different from those which are best suited to it, the strains so far available should not be grown at altitudes lower than 4,500 ft.

156. WADLEY, F. M., AND SULLIVAN, W. N. 632.951

A study of the dosage mortality curve.

*J. econ. Ent.*, 1943, 36: 367-72, bibl. 11.

The concentration-mortality was studied, adult houseflies and pyrethrum sprays being used for this purpose. Tendencies noted repeatedly in the work of others suggested tests of several points. There was strong indication of a definite threshold of toxic concentration. Numbers of insects were insufficient for checking the significance of 100% mortality at the highest concentration. The lower bend in the asymmetric sigmoid curve was not well defined. When spray concentrations were transformed to logarithms and percentages of mortality to probits, the data indicated significant and definite curvature. Linearity was positively disproved in this material. It seems likely that the log-probit transformation is useful but not perfect, that extrapolation should be discouraged, and that further study of the curve is justified. [Authors' summary.]

157. McINDOO, N. E. 632.951.1  
Present status and future trends of nicotine as an insecticide.

*J. econ. Ent.*, 1943, 36: 473-5, bibl. 1.

Lists are given of the insects against which nicotine is and is not effective.

158. HELSON, G. A. H., AND POWNING, R. F. 632.951

Two promising insecticides.

*J. Coun. sci. industr. Res. Aust.*, 1943, 16: 107-8, reprinted *Fruit World*, Melbourne, 44: 9: 6.

An almost forgotten insecticide, patented under the name "Paranaph" in 1895 by H. Cousins of Cambridge University, is recommended for use in Australia as a substitute for imported nicotine sulphate now difficult to get. It gives efficient control of the cabbage aphid, *Brevicoryne brassicae*, which is difficult to kill with nicotine sulphate and is somewhat less effective than nicotine sulphate against other aphids. It kills at temperatures as low as 48° F. which nicotine sulphate does not. It thoroughly wets insects and plants on impact and is innocuous to the larvae of aphid-destroying syrphid flies. To prepare, add to 56 lb. fresh soft soap 2 gal. water, simmer till uniformly melted, stirring constantly. Add 6 lb. whizzed or flake naphthalene and stir till dissolved. Remove from the fire and add 2 imp. gal. kerosene and stir till uniform. The product is semi-solid and used at the rate of 1-2 gal./100 gal. water (preferably soft) or 3-4 tablespoons to gal. water. Creonaph, a substitute made entirely from Australian materials, is made and used in the same way except that the kerosene is replaced by 2 gal. spraying creosote, boiling range 250°-350° C. This latter preparation may cause some injury and must at present be used with caution. It was particularly effective against *Nysius vinitor*, the Rutherglen bug.

159. ANON. 632.951.8

A recent development in winter washes.

*J. roy. hort. Soc.*, 1944, 69: 14-5.

A brief summary of the advantages of using an emulsion of petroleum oil and dinitro-ortho-cresol as a winter wash in private and smaller orchards. Directions for the application of this wash, generally referred to as D.N.C., are also given.

160. BAILEY, J. S., AND BOURNE, A. I. 634.75-2.95  
An unusual type of ethylene dichloride injury to peach.

*J. econ. Ent.*, 1943, 36: 470-1.

The rapid volatilization of ethylene dichloride applied to peach trees as a 15% emulsion at the rate of 0.5 pint per tree injured the young sprouts, the injury taking the form of the bending of the tips of the shoots followed by death of the tissue and collapse of the shoot.

161. SUDDS, R. H., AND MARSH, R. S. 634.11-2.111

Winter injury to trunks of young bearing apple trees in West Virginia following a fall application of nitrate of soda.

*Proc. Amer. Soc. hort. Sci. for 1943*, 1943, 42: 293-7, bibl. 5.

BRIERLEY, W. G., AND LANDON, R. H.

634.75-2.111

Cold resistance of strawberry plants in the early stages of growth.

*Proc. Amer. Soc. hort. Sci. for 1943*, 1943, 42: 432-4, bibl. 1.

FULTON, R. W.

632.8

The sensitivity of plant viruses to certain inactivators.

*Phytopathology*, 1943, 33: 674-82, bibl. 15.

WOODS, M. W., AND DuBUY, H. G. 632.8  
Evidence for the evolution of phytopathogenic viruses from mitochondria and their derivatives. I. Cytological and genetic evidence.

*Phytopathology*, 1943, 33: 637-55, bibl. 21.

II. Chemical evidence.

*Phytopathology*, 1943, 33: 766-77, bibl. 22.

GOTTLIEB, D., AND HART, H. 577.15.04: 632.45  
Growth substances and the rust fungi.

*Phytopathology*, 1943, 33: 724-8, bibl. 6.

KEITT, G. W., LANGFORD, M. H., AND SHAY, J. R. 632.42: 634.11

*Venturia inaequalis* (Cke.) Wint. II. Genetic studies on pathogenicity and certain mutant characters.

*Amer. J. Bot.*, 1944, 30: 491-500, bibl. 11.

PAINTER, R. H. 632.6/7  
Insect resistance of plants in relation to insect physiology and habits.

*J. Amer. Soc. Agron.*, 1943, 35: 725-32, bibl. 17.

TREHAN, K. N. 632.96

The rôle of predators in biological control of insect pests.

*Curr. Sci.*, 1943, 12: 223-5, bibl. 16.

TATTERSFIELD, F., AND POTTER, C. 632.951  
Biological methods of determining the insecticidal values of pyrethrum preparations (particularly extracts in heavy oil).

*Ann. appl. Biol.*, 1943, 30: 259-79, bibl. 5.

PARKIN, E. A., AND GREEN, A. A.

632.951: 664.8

A film technique for the biological evaluation of pyrethrum-in-oil insecticides for use against stored product insects in warehouses.

*Ann. appl. Biol.*, 1943, 30: 279-92, bibl. 13.



MARTIN, J. T. 632.951  
The preparation of a standard pyrethrum extract in heavy mineral oil, with observations on the relative toxicities of the pyrethrins in oil and aqueous media.  
*Ann. appl. Biol.*, 1943, 30: 293-300, bibl. 21.

COWAN, F. T., SHIPMAN, H. J., and WAKELAND, C. 632.729  
Mormon crickets [*Anabrus simplex*] and their control.  
*Farmers' Bull. U.S. Dep. Agric.* 1928, 1943, pp. 17.

## VEGETABLE, RUBBER AND OTHER PLANTS

162. MARQUES DE ALMEIDA, C. R. 635.1/7  
As hortas abastecedoras de Lisboa. (The market gardens supplying Lisbon.)  
*Publ. Minist. Econ., Lisboa, Ser. Estud. Inform. tec.* 19, 1942, pp. 19.  
A brief tour round the market garden districts supplying Lisbon, with some discussion on the future of vegetable growing for market in Portugal. The need for gardeners to keep up to date in the results of modern research as applied to this section of horticulture is pointed out.
163. ANON. 635.1/7  
Der Gemüsebau. (Vegetable production.)  
*Wirtsch. u. Statist.*, 1943, 23: 9-10, from abstract  
*Forschungsdienst*, 1943, Vol. 15, abstr. p. 57.  
In Germany, including the attached areas of the East, 312,962 hectares were devoted to vegetable growing in 1942, an increase of 48% over 1941. Cabbage held the first place with 47,000 hectares, followed by carrots (28,000), green peas (23,000), spinach (20,000) and green beans and red cabbage (18,000 each). 13% of the vegetable area produced early vegetables, 50-3% summer and autumn vegetables and 36-7% winter vegetables. Of the provinces, the Rhine province devoted the largest area to vegetable production.
164. WERTH, A. J. 635.1/7: 631.411.1  
Mehr Gemüsebau auch auf Moorböden. (Increased vegetable cultivation on moor soils.)  
*Dtsch. Landeskult.-Ztg.*, 1942, 11: 3: 53 (*Mitt. Moorwirtsch.*, 1942, 7: 3: 9), from abstract  
*Forschungsdienst*, 1943, Vol. 15, abstr. p. 12.  
The growing of cabbage, peas, beans and cauliflower on high moor and lowland moor soils as well as the cultivation of these vegetables for seed are described.
165. ROUX, A. 635.1/7: 581.084.2  
Sonderfragen des Feldversuches im Gemüsebau. (Special problems of vegetable field experiments.)  
R. Bechtold & Co., Wiesbaden, 1942, pp. 60, RM. 4, from review *Forschungsdienst.*, 1943, Vol. 15, abstr. p. 17.  
Analysing the work on 10,000 plots the author indicates the suitable size and shape of experimental plots for most vegetables. The balancing of systemic errors and the substitution of missing values are his main subjects in a statistical discussion. The vegetables are listed according to their greater or less suitability for experimental work and a list of plants indicating phosphoric acid and potash deficiencies is added.
166. AAMODT, O. S. 631.531: 635.1/7  
The seed situation and the war.  
*J. Amer. Soc. Agron.*, 1943, 35: 85-91.  
The production situation of various kinds of agricultural seeds in U.S.A. is discussed in relation to current war needs. Production of vegetable seeds in 1942 was an improvement on 1941 but did not reach the target set up for the season. Beet, carrot and onion seed was at least one-third below estimated production. Pole beans, mangel beet, Swiss chard, peas, radish, summer squash and tomato seed appeared to have exceeded the estimate.
167. HASKELL, G. 631.531: 635.1/7  
Spatial isolation of seed crops.  
*Nature*, 1943, 152: 591-2, bibl. 16.  
A survey of recent investigations to determine the safe isolation distances for the vegetable seed crops of Great

Britain. Any two members of the same *Brassica* group must be kept from one to two miles apart. Bees are the chief agents for dispersing pollen, and wind also carries the pollen of kale and kohlrabi. The usual minimum isolation for radish is 40 rods, though it has been shown at the John Innes Institution that little or no crossing occurs beyond 80 ft. In Sweden turnips did not cross more than 1% at 27 yards between crops. Soy beans give 1% to 2% natural cross pollination in the field but only 16% between plants in alternate rows. Broad beans give from 5% to 10% natural crossing in the field; evidence of correct spatial isolation is not available. French beans are cross-pollinated by thrips. English seed growers consider cross-pollination of most varieties of beans to be negligible. Peas are self-fertile and a separation of 40 rods completely eliminates cross pollination. Although the *Umbelliferae* are commonly isolated even to the extent of half a mile between carrot varieties there is no evidence on their minimum requirements. Cucumbers require 40 rods in the field. Nothing is known of marrows. Many growers do not isolate lettuce. Under very close experimental planting, the lateral branches of the seed stalk just not touching, 1.33-6.22% outcrossing was obtained. Sunflowers exhibit 70% of natural crossing, mostly by bees. Isolation distances are not known for sunflower, safsify, scorzonera, chicory and endive. In the field there is a 2-4% contamination of tomatoes between rows. A spacing of 24 ft. between varieties almost entirely eliminates this. Thrips and not wind are possibly the transmitting agents. In England the chenopods are grown under enforced zoning schemes. Beetroot is chiefly wind-pollinated, the pollen is known to carry over 2 miles but there is little real contamination over 2½ furlongs. Thrips are active in pollinating sugar beet. Spinach is wind-pollinated, isolation distance in Canada being a quarter of a mile and in England undetermined. All onion varieties intercross, chiefly by insect but also by wind agency. They are given a minimum of 40 rods isolation in England and ½ mile in Canada. Leeks are given 250 yards. For maize, contamination is eliminated at 23 rods, Canadian growers prefer a distance of a mile with a natural barrier such as trees in between. In U.S.A. the legal spatial isolation is 40 rods.

168. BARNES, H. 635.1/7: 631.531

Growing vegetables for seed.  
*Qd agric. J.*, 1943, 57: 84-9.

Vegetable growers in Australia are encouraged to grow their own seed. The production under Queensland conditions of pumpkin, marrow, cucumber, tomato, French bean, lettuce, carrot and cabbage seed is described.

169. MASLENNIKOV, I. P. 635.1/7: 631.531: 632.6/7

Pests of vegetable seed production. [Russian.]  
*Vestnik ovoševodstvo i kartofel'*, 1941, No. 2, pp. 51-6.

During a period of observation lasting from 1935 to 1940, at the Gribov station for breeding vegetable crops, 60 species of pest, including insects, mites, slugs and rodents, were identified and their names are listed in this article. The cruciferous crops were attacked by more pests than any other order. Then in descending order of number of pests come beetroot, onions, peas, cucumbers, carrots, tomatoes, the last named suffering very little and that mainly from mice when grown under glass. Some of the species noted were only of potential pest value. Pests were most troublesome during the dry years, 1936 and 1938. Species of the

*Phyllotreta* genus were the most numerous. *Plutella maculipennis* was a serious pest in 1940, and little is known as to its control. Control methods are not described in detail. Besides general management to prevent attack, the use of nicotine sulphate and anabasin is recommended. There is evidence to suggest that biological control by *Trichogramma* might be effective against *Barathra brassicae*.

170. OSIPOV, V. S. 631.531.12(47): 635.1/7  
The production of elite seed. [Russian.]  
*Vestnik ovoščevodstvo i kartofel'*, 1941, No. 2,  
pp. 3-11.

In 1939 and 1940 official action was taken, in regard to the R.S.F.S.R., in order to define the term "elite seed", and to improve the production of the seeds of vegetables and fodder roots. The need for accurately describing different varieties, and defining their genetical characters resulted in a conference organized by the Commissariat of Agriculture and held in March 1941. Among the subjects which were discussed, that relating to genetical purity and deviation from type aroused much attention. Some of the delegates believed that it was useless or undesirable to enforce standards of conformity to type which might prove too high, and were sometimes sceptical of the value to be gained by allowing certain morphological peculiarities to set a limit to the plant breeders' efforts, or of the reliability of such peculiarities as indicators of a variety. Variation in spine colour in cucumbers for instance was ascribed not to hybridization but to the Darwinian principle of "divergence". The author, who is Chief of the Variety Seed Department of the Vegetable Growing Administration of the Agricultural Commissariat, points out in what respects such opinions are erroneous and cites, in support of his statement, some practical results. Many simple morphological characters, unimportant in themselves, are associated in a given variety with other, valuable qualities, and can be used with advantage as indicators of authenticity. The author's experience does not support the view that high yield and quality are incompatible with morphological uniformity. The opinion is expressed that definite conditions should be laid down indicating the type of admixture that is not permitted, such as the possibility of crossing with the wild species in carrot, beet, parsley, radish and various other plants, of crossing with other varieties in cabbage, with other species in tomatoes, water-melons, etc., and the presence of forms with white fruit or white pubescence in cucumbers. It has been decided that seed production should be carried out only under optimum cultural conditions, with the application of intraracial crossing and careful selection.

171. GREGORY, J. H. 635.1/7: 658.8  
Vegetable marketing in Queensland.  
*Qd agric. J.*, 1943, 57: 150-8.

Hints to agricultural growers relating to the achievement of high standards in the marketing of their vegetables.

172. WILSCH, L. 635.1/7: 577.15.04  
Ertragssteigerung durch Wuchsstoffbehandlung der Wurzeln. (Increase of yield through root treatment with growth substances.)  
*Blumen-u. Pflb.*, 1942, 46: 103, from abstract  
*Forschungsdienst*, 1943, Vol. 15, abstr. p. 18.

Dipping young cabbages, savoy and kale plants into a solution of the growth substance preparation Eubion resulted in considerably increased yield.

173. SECRET, F. A. 635.1/7: 631.87  
The importance of organic manure for market-gardening.  
*Agriculture*, 1944, 50: 445-9.

It appeared desirable to the author to stress the necessity for generous applications of organic manures in market-gardening in view of the fact that the NPK school does not acknowledge the difference in the problems of specialized

vegetable growers and cereal farmers who have much more scope for fitting vegetables into their rotation. In support of his argument the author points to the French system where humus dressings help to maintain soil fertility on land producing 7 crops a year. A few suggestions relating to the application of organic manures for vegetable crops in Britain are made and the relative merits of some organic fertilizers, such as hoof (the best substitute for stable manure), meat and bone meal, fish meal, guano and dried blood, bone flour, meal and grist and composted straw are discussed. Under wartime conditions growers should confine themselves to supplying the immediate needs of their crops and abstain from building up an accumulation of fertility.

174. HUTCHINS, A. E., AND KRANTZ, F. A. 635.1/7: 631.878  
Peat as a soil supplement in vegetable production. A preliminary report.  
*Proc. Amer. Soc. hort. Sci. for 1943*, 1943, 42: 502-6.

At the Minnesota University Farm over 11 years' applications of peat have kept up the organic content of the soil practically as well as farm manure. Peat has some value as a source of nitrogen but this is not readily available and in vegetable production readily available nitrogen as well as potash and phosphorus should be supplied from some other source. Potato yields were maintained by the use of commercial fertilizers on plots which had received no organic matter for 11 years, but beet yields were higher on plots receiving organic matter.

175. TORČIKOV, I. I. 635.1/7: 631.8  
The efficiency of organic and artificial manures when applied in combination to vegetables grown in rotation.  
*Vestnik ovoščevodstvo i kartofel'*, No. 5, 1940, pp. 13-25.

The purpose of the experiment described here was to compare the effects of NPK fertilizers and organic manures (horse dung or town refuse) applied in combination to cucumbers, cabbage, beetroot and early potatoes with the effects of the same substances applied separately. The experiment was carried out during the period 1933 to 1936 on sandy soil near Moscow. The vegetables, which were the objects of the experiment, were grown in a four-course rotation in the order given above. The results showed that organic and artificial manures when used in combination generally yielded more satisfactory results than either used separately, and that the effects of town waste were similar to those of dung, but less pronounced.

176. ZHURBICKI, Z. I. 635.1/7: 631.8  
Organic and mineral manures in vegetable crop rotations.  
*Vestnik ovoščevodstvo i kartofel'*, No. 5, 1940, pp. 3-12.

The comparative values of organic and artificial manures to vegetable crops grown in sandy soil are noted. When cucumbers were grown experimentally in soil to which dung and artificials were applied separately and in combination, their yields were influenced not only by what the plants assimilated through their roots but also by the CO<sub>2</sub> assimilated by their leaves, which was given off by the soil in amounts varying with the amount and kind of manure used. The author concludes that dung in combination with fertilizers results in a greater increase in yield (as compared with the control) than do either dung or fertilizers separately, and that of the increases associated with dung or NPK, separately or in combination, about a half may be accounted for by the CO<sub>2</sub> which the leaves of the plants assimilate. The experiment thus shows that the maximal production of CO<sub>2</sub> occurred when NPK and dung were applied in combination. Whether a crop responds best to organic or artificial manures is determined by the rate at which its demands on the various manurial



elements increase; those crops in which the rate is rapid answer best to mineral manures, those in which it is comparatively slow may have their requirements adequately satisfied at the rate at which the elements become available as the organic manure decays. The author concludes that all species of cabbage, as well as leeks, spinach and tomatoes respond best to mineral manures; and that cucumbers, onions, carrots, parsnips and lettuce respond best to dung. Potatoes, beet and celery are intermediate in this respect. It is therefore recommended, in order that both organic and mineral manures may be used to the greatest advantage, that they be judiciously applied in combination, their relative proportion being determined both by the considerations indicated above and others relative to soil type, as well as the acidity and concentration of solution in soils. In this connexion it should be mentioned that whereas organic manures had the effect upon the soil of reducing its hydrolytic acidity, increasing its absorptive capacity, and imparting to it basic properties, mineral manures exerted the opposite effects.

177. HILL, H. 635.1/7: 632.19  
Malnutrition symptoms and plant tissue tests of vegetable crops.  
Reprinted from *Better Crops with Plant Food Magazine* and distributed by Amer. Potash Institute, 1943, pp. 7.

Plant tissue tests of carrots, garden peas and beets, grown in sand culture in the greenhouse, were carried out at the Central Experimental Farm, Ottawa. The deficiency symptoms are described and the results of the tissue analyses are indicated in 2 tables.

178. LIVINGSTON, J. E. 635.1/7: 632.3/4  
Vegetable diseases in Nebraska.  
*Ext. Circ. Neb. Coll. Agric.* 1801, 1942, pp. 35.  
The circular covers the common vegetable diseases in 3 sections under the following headings:—(1) Description of common vegetable diseases; (2) General control measures; (3) Disease control measures that should be practised each year.

179. LÍMAN, H. K. 632.954: 635.1/7  
Die Unkrautbekämpfung im Gemüsebau unter besonderer Berücksichtigung chemischer Methoden. (Weed control in vegetable cultivation with special reference to chemical methods.)  
R. Bechtold & Co., Wiesbaden, 1942, pp. 92.  
R.M. 6.50, from review *Forschungsdienst*, 1943, Vol. 15, abstr. p. 55.  
In this book on weed control the stress is laid on chemical methods. According to the author's own experiments chemical control methods are particularly successful on moist soils rich in humus, which do not require much hoeing. Best results were obtained with a 10% fruit tree carbolineum, sprayed in a fine mist at the rate of 150-220 c.c. per square metre. Other chemicals tested by the author were various carbolineum solutions, raphanit, sulphuric acid and sodium chlorate.

180. BROWN, E. O., and PORTER, R. H. 632.51  
The viability and germination of seeds of *Convolvulus arvensis* L. and other perennial weeds.  
*Res. Bull. Ia agric. Exp. Stat.* 294, 1942, pp. 475-504, bibl. 11.  
The weeds dealt with in this bulletin are:—*Convolvulus arvensis*, *Euphorbia esula*, *Lepidium draba*, *L. repens*, *Centaurea repens*, *C. calcitrapa*, *C. solstitialis*, *Solanum carolinense*, *S. elaeagnifolium*, *Hymenophyllum pubescens*.
181. SCHWENDIMAN, A., TORRIE, J. H., and BRIGGS, G. M. 632.954  
Effects of Sinox, a selective weed spray, on legume seedlings, weeds, and crop yields.  
*J. Amer. Soc. Agron.*, 1943, 35: 901-8, bibl. 3, being *Paper Wis. agric. Exp. Stat.* 191.  
The effect on legume seedlings and weeds of sodium dinitro-ortho-cresylate, known commercially as Sinox, was studied

at Wisconsin. 80-100 gallons of 1% Sinox per acre were found to control wild mustard and other broad-leaved weeds 80-100%, if applied when the weeds were in the 3-7 leaf stage. At an age of about 5-6 weeks red clover and alfalfa seedlings were fairly resistant to the spray and did not suffer to any extent where the stand was not too dense. Sweet clover, however, was very susceptible to spray injury. Spraying increased the yields of oats, barley and flax by 10-100% according to seriousness of weed infestation.

182. MUGGERIDGE, J. 632.78  
The white butterfly (*Pieris rapae* L.). I. Its establishment, spread, and control in New Zealand.  
*N. Z. J. Sci. Tech.*, 1942, 23: 107A-29A, bibl. 18.  
The European small white butterfly reached New Zealand in 1930. It had covered the whole country by 1936 and is now a serious pest.

183. MINISTRY OF AGRICULTURE, LONDON. 635.1/8: 631.544  
Crop production in frames and cloches.  
*Bull. Minist. Agric. Lond.* 65 (4th ed.), 1943, pp. 36, 1s.

The public has not had to wait long for a new edition of this bulletin on production of crops in frames, the last edition having been issued and reprinted in 1942 (*H.A.*, 12: 900). The revision is particularly noticeable in the part which refers to the use of electricity for soil warming. This has been brought up to date with the help of Mr. C. A. Cameron Brown of the Electric Research Association, who also gives some useful references to further articles on the subject. To take full advantage of certain of the recommendations made in this bulletin will only be possible when fuel and wood supplies become easier, but this detracts little from its present and not at all from its future value.

184. EMEĽ'ANOV, I. E. 631.544  
The technique of conducting experiments in frames and glasshouses. [Russian.]  
*Vestnik ovoščevodstvo i kartofel'*, 1941, No. 2, pp. 12-26.

The present article is based on the author's experiments carried out at the Institute of Vegetable Crops, Timiriazev Agricultural Institute. In addition to matters of practical concern in conducting an experiment and managing the frames or glasshouses the author gives much attention to the areas and dimensions of the beds, replication, suitable arrangements of plots to reduce the errors arising from the unevenness of temperature and other characteristics of the environment always present inside frames and glasshouses, and to several other considerations of importance which may affect the validity of comparisons. For instance he investigated the relative importance of comparing equal numbers of plants of the same kind grown in plots of unequal dimensions with unequal numbers of plants grown in plots of equal dimensions. Thus it was found that with such crops as tomatoes, cucumbers and cauliflowers, the result of an experiment is less affected by the peculiarities of the individual plants than by dissimilar numbers of plants per given area.

185. MILLER, E. V., and JACOB, K. D. 631.84  
Effect of sodium acetate on plant growth and soil pH value as indicated by greenhouse experiments.  
*J. Amer. Soc. Agron.*, 1943, 35: 909-10.

A fertilizer material containing sodium acetate, an impurity which is a by-product of certain wax chemicals, and its effects on German millet were studied at Beltsville, Md. It was found that sodium acetate did not affect the crop in either the presence or absence of nitrogenous fertilizers. The alkalinizing effect of the chemical after 8 weeks was pronounced in the absence of nitrogenous fertilizers. In their presence, however, the pH values remained fairly

constant up to applications of 420 lb. of sodium acetate per acre, the alkalinizing effect being counterbalanced by the acidifying effect of ammonium sulphate.

186. RICHARDSON, H. H., AND OTHERS.

631.544; 632.944

Studies of methyl bromide in greenhouse and vault fumigation.

Tech. Bull. U.S. Dep. Agric. 853, 1943, pp. 22, bibl. 23.

Overnight fumigation with 1-1½ lb. of methyl bromide per 1,000 cubic feet gave complete control of the cyclamen mite (*Tarsonemus pallidus*) red spider (*Tetranychus bimaculatus*) and the Mexican mealybug (*Phenacoccus gossypii*) at 67° F. under fairly dry conditions in winter in a small greenhouse. In summer, when there was no heat on, the dosage could be reduced by one half at a similar temperature. The gas was also effective against insects in the soil of pots or benches in a greenhouse, provided the soil was not saturated with moisture, but it did not penetrate so readily into soil floor beds. For the control of insects on the foliage it is advisable to water the floor and bench soil heavily just before fumigation so as to eliminate the loss of gas into the soil and to reduce the dosage needed. Fumigations should be applied at night or under overcast conditions and the greenhouse should be thoroughly ventilated afterwards. A normal dosage of methyl bromide at 67°-70° F. was injurious to a small number of plants, among them garden lettuce, which will, however, tolerate concentrations sufficient to control aphids and white flies. 36 kinds of plants or varieties, which will withstand fumigation at 67°-70° F. at the dosage mentioned at the outset, are listed. From the practical point of view rapid evaporation of the fumigant obtained by spraying seemed a more advisable application of methyl bromide than slow evaporation from shallow pans or rapid evaporation from heated pans.

187. EKSTRAND, H.

674.048; 581.14

För växter giftiga träimpregneringsmedel. (Wood preservatives poisonous to plants.)

Växtskyddsnötiser, 1942, Nr. 6, pp. 81-4.

Certain wood preservatives containing fluorine were tested at the Plant Protection Station, Stockholm. Although applied in very small amounts to plant boxes and in greenhouses the materials proved poisonous to plants even after a period of 6 years.

188. EVANS, G.

633.491-1.532.2

Potato eyes as readily transportable "seed" for the colonies.

Nature, 1943, 152: 464-6, bibl. 4.

An account is given of preliminary experiments at the Royal Botanic Gardens, Kew, to test the practicability of using potato eyes rather than whole seed to supply certain British overseas dependencies with easily transportable planting material. The season being advanced when the experiments began, it was only possible to use eyes which had just started to sprout. These were cut from the rose end in the form of a thin chip about 1 in. in diameter and ¼ in. thick. They were placed, cut surface upwards, on trays of peat moss (to prevent sprout injury). In 24 hours the cut surfaces had hardened and in 4 days they had assumed a concave shape owing to shrinkage. Chips planted 24 hours after cutting and others stored for 10 days in wooden boxes, after 24 hours on the peat moss, before planting gave about 100% stand. Others again, planted 24 days later, gave 80% successful sprouting. The variety was Majestic. The loss of weight of the cut chips was 12% after 24 hours and 65% in a week. Thus with this system the weight required for transport would be only ⅓ that of normal seed. The total and graded yields of the chips were only slightly inferior to those of whole seed and superior to those from chats. More data are required on several points, namely, on a standardized method of preparing chips for export, on length of period of viability, on trials

with unsprouted chips, on spacing, planting and variety. There is also the question of breaking dormancy, since the plantings in the territories concerned begin in August.

189. SOLODOVNIKOV, F. S.

633.491: 581.142

Planting seed potatoes immediately after lifting in Kazakhstan. [Russian.]

Proc. Lenin Acad. Agric. Sci., 1942, Nos. 9-10, pp. 22-5.

On account of the high temperature which is characteristic of the spring and summer months in Kazakhstan, it has been found difficult to preserve seed potatoes during the interval between the autumn of the preceding year and the following summer which, for this reason, it was believed should be a more suitable season than spring for planting potatoes, if the above-mentioned difficulty could be overcome and tubers made easily available in summer. It has been overcome, as described in this article, by obtaining young tubers from a crop of potatoes planted in spring, and, after sprouting them within a period of 5 to 10 days, planting them at the end of July or in early August and gathering the crop in autumn when the frost has killed the haulms. Such rapidity of sprouting was accomplished by means of a method devised by Lysenko and based on the fact that sprouting is initiated most readily when the flesh of the tuber is placed in conditions of adequate aeration yet not of excessive dryness. Such conditions may be provided by skinning the tubers, putting them in a single layer on light, friable and moist soil, covering them with more of such soil to a depth of 4 or 5 cm. and adopting suitable measures for maintaining moisture. As soon as sprouts, 1 cm. long, have been produced by the tubers, planting is begun again, in soil which is friable and kept moist throughout the growing period. Development is rapid and, from the physiological point of view, unusual; for tuber formation begins as soon as the shoots have emerged, 8-10 days after planting, and large tubers, with only a negligible proportion undersized, are produced before flowering has properly begun. Flowering is therefore no indication of tuber formation. Tuber yields were at the rate of 400 to 800 g. per plant. Both in sprouting and in the emergence of the shoots in the field, the early variety, "Early Rose" was slower than later varieties, and "Epicure" was slower still.

190. NEUBERGER, A., AND SANGER, F.

633.491: 581.192

The nitrogen of the potato.

Biochem. J., 1942, 36: 662-71, bibl. 30.

Methods are described for the estimation of different types of nitrogenous substances in plant extracts. A number of nitrogenous compounds have been isolated from potatoes, such as asparagine, glutamine and arginine, all present in fairly large amounts. Analyses are presented of the N contents and distributions in a number of domestic varieties and it is shown that varieties differ considerably in their protein and amide contents. The nitrogenous compounds are not equally distributed over the tuber. Thus the insoluble nitrogenous material is mainly present in the skin and cortex, glutamine in the inner and asparagine in the outer layers. The bearing of these results on the biological value of the potato N is briefly discussed. [From authors' summary.]

191. CZERWINSKI, H.

632.753: 633.491-2.8

Untersuchungen und Beobachtungen über die Blattlaus *Myzodes persicae* Sulz. als Verbreiter des Kartoffelabbaues auf dem Versuchsfeld des Instituts für Acker- und Pflanzenbau Berlin-Dahlem und dem Versuchsgut Thyrow. (Investigations on the role of the aphid *Myzodes persicae* in the spread of potato breakdown at Berlin-Dahlem and the experimental farm of Thyrow.)

Angew. Bot., 1943, 25: 201-50, bibl. 35.

Observations over a period showed that incidence of potato breakdown at Dahlem was consistently much higher than



at Thyrow, 40 km. south-west of Berlin. The author offers as an explanation the fact that there are 152 peach trees per hectare at Dahlem, which provide the aphid, *Myzodes persicae*, with an opportunity for hibernating, as against 7 peach trees per hectare at Thyrow. Effect of climate, aphid migration and time of infection are among the subjects discussed in detail.

192. SMALL, T. 633.491-2.4  
Black scurf and stem canker of potato (*Corticium solani* Bourd and Galz). Field studies on the use of clean and contaminated seed potatoes and on the contamination of crop tubers.  
*Ann. appl. Biol.*, 1943, 30: 221-6, bibl. 4.

The investigations reported were carried out on infected land at Warburton, Cheshire, in 1941 and 1942. Black scurf was present on crops from clean seed but was more severe on crops from contaminated seed. The yields from both were satisfactory and not significantly different. Late planting failed to reduce the amount of black scurf. Although all the trial varieties, namely Arran Banner, Kerr's Pink, King Edward and Majestic, were heavily infected, the results show that little if any loss is caused under farm conditions.

193. SALAMAN, R. N. 633.491-1.523  
Recent research in potato breeding.  
*Emp. J. exp. Agric.*, 1943, 11: 125-39, bibl. 72.  
(VELDSTRA, H., AND VAN STUIVENBERG, J. H. M.)  
577.15.04: 633.491  
Use of growth-promoting substances for inhibiting the development of potato eyes during storage.  
*Int. Rev. Agric. Rome (Mon. Bull. agric. Sci. Pract.)*, 1943, 34: 205.  
TEAKLE, L. J. H., AND MORGAN, E. T.

633.491-1.811.9  
Experiments with micro-elements for the growth of crops in Western Australia. VII. The effectiveness of various types of copper fertilizers for potatoes at Bornholm, Albany.  
*J. Dep. Agric. W. Aust.*, 1943, 20: 119-23.

BALD, J. G. 633.491: 581.144.2  
Estimation of the leaf area of potato plants for pathological studies.  
*Phytopathology*, 1943, 33: 922-32.

BONDE, R., SCHULTZ, E. S., AND RALEIGH, W. P. 633.491-2.8  
Rate of spread and effect on yield of potato virus diseases.  
*Bull. Me. agric. Exp. Stat.* 421, 1943, pp. 28, bibl. 10.

RIEMAN, G. H., AND MCFARLANE, J. S. 633.491-2.8  
The resistance of the Sebago variety to yellow dwarf.

*Amer. Potato J.*, 1943, 20: 277-83, bibl. 5.  
BALD, J. G. 633.491-2.8  
Potato virus X: Mixtures of strains and the leaf area and yield of infected potatoes.  
*Bull. Coun. sci. industr. Res. Aust.* 165, 1943, pp. 32, bibl. 14.

194. ARNY, A. C. 633.52-1.523  
Flax varieties registered.  
*J. Amer. Soc. Agron.*, 1943, 35: 823-4.

The first two flax varieties to be registered under the co-operative agreement between the Bureau of Plant Industry and the American Society of Agronomy are *Biving* and *Redson*, both arising from crosses *Redwing* × *Bison*.

195. ANON. 633.52  
Linen flax.  
*Bull. Canterbury agric. Coll.*, 166, 1943, pp. 4.  
Suitable methods for the cultivation of linen flax in New Zealand are described. 1-4 tons of straw per acre can be expected.

196. ANON. 633.52  
Ausdehnung der französischen Flachsbaubereichsfläche. (Extension of flax acreage in France.)  
*Forschungsdienst*, 1943, 15: 108.

Cultivation of flax in France is to be raised from 35,000 hectares in 1942 to 50,000 hectares in 1943. Half of the crop is to be put at the disposal of the Belgian flax industry.

197. FORSYTH, D. D., AND SCHUSTER, M. L. 633.52-1.531.17  
Abnormal leaf formation on flax seedlings caused by Spergon.  
*J. Amer. Soc. Agron.*, 1943, 35: 733-5.

The lateral fusion of 2-6 leaves on flax seedlings after seed treatment with Spergon was observed at the Pullman Experiment Station. The chemical was thought to enter the seed through cracks in the seed coat resulting from machine-threshing.

198. EGGLEHUBER, E. 633.52-2.112  
Einfluss der Trockenheit auf den morphologischen und anatomischen Bau der Leinpflanze. (Effect of drought on the morphological and anatomical structure of flax.)  
*Faserforschung*, 1942, 15: 165-77, from abstract  
*Forschungsdienst*, 1943, Vol. 15, abstr. p. 56.

The susceptibility of flax to drought varies according to time of incidence. Drought before flowering is harmful to the external structure of the plant, whilst anatomical damage due to drought occurs particularly during and after flowering.

199. COLHOUN, J. 633.52-2.4  
Grey mould (*Botrytis cinerea*) of flax.  
*Nature*, 1944, 153: 25-6.

An examination of flax seed for seed-borne parasites at the Queen's University, Belfast, recorded 25% contamination with *Botrytis cinerea*. Seed treatment with Nomersan at the rate of 12 oz. per cwt. of seed or with Ceresan U564 controlled the disease almost completely.

200. OPITZ, K. 633.52-1.8  
Über die Bedeutung des Verhältnisses von Stickstoff zu Phosphorsäure bei der Düngung des Leins. (The significance of the nitrogen-phosphoric acid ratio in the manuring of flax.)  
*Pflanzenbau*, 1942, 18: 321-47, from abstract  
*Forschungsdienst*, 1943, Vol. 15, abstr. p. 68.

MORISON, G. D. 633.52-2.73  
Notes on *Thysanoptera* found on flax (*Linum usitatissimum* L.) in the British Isles.  
*Ann. appl. Biol.*, 1943, 30: 251-9, bibl. 37.

201. WILSIE, C. P., DYAS, E. S., AND NORMAN, A. G. 633.522  
Hemp.

*Bull. Ia agric. Exp. Stat.* P49, 1942, pp. 586-600.  
Iowa farmers have been asked to grow hemp, a new crop for the area, on a large scale. The bulletin compiles the best information available on hemp production, adapted, as far as possible, to Iowa conditions. A programme of concurrent research and extension activities has been drawn up.

202. ROBINSON, B. B. 633.522-1.531.17  
Greenhouse seed treatment studies on hemp.  
*J. Amer. Soc. Agron.*, 1943, 35: 910-4.

The U.S. Bureau of Plant Industry arranged for the effect of seed treatment on hemp to be tested at different experiment stations. The results show that treatment with any of the dusts employed was beneficial. It is suggested that treatment of valuable hemp seed should be centralized at the mills.

203. ANON. 634.38: 633.5  
Textilfasern aus Maulbeerbaumrinde. (Fibres from the cortex of mulberry trees.)  
*Forschungsdienst*, 1943, 15: 107-8.

Experiments have shown that the cortex of mulberry trees supplies fibre of special tensile strength. The exploitation of Bulgarian plantations and the combination of mulberry fibres with other fibres are planned for large-scale production.

204. ANON. 633.913 + 633.5  
Erfolgreicher Anbau von *Asclepias* im General-gouvernement. (Successful cultivation of *Asclepias* in Poland.)  
*Forschungsdienst*, 1943, 15: 181-2.

Fibre research in Poland has shown *Asclepias* fibres to be equal in quality to sisal fibres. The plant is said to produce 1,400 kg. fibre per hectare with 100 kg. of rubber as a by-product. It will grow on very poor soil and requires less labour than truck crops.

205. ARIGÓS VILLANUEVA, F. 633.71-1.536  
Transplante de tabaco. (Transplanting tobacco.)  
*Alm. Minist. Agric. B. Aires*, 1941, 16: 255-6.

Suggestions are made for the successful transplanting of tobacco in Argentina. The nursery beds should be well watered before lifting the plants, which preferably should be 45-60 days old, 10-12 cm. high, with firm stems bearing 5 leaves. A cool, cloudy day should be chosen. The lifted plants are packed side by side, root downwards, in a slightly slanting position in containers having a depth of 10-15 cm. If transplanting is to be to non-irrigated land, the plants will be more resistant if well watered 2 or 3 days before moving. When lifting is suspended the nursery beds should be given a good watering to settle the disturbed earth round the roots of the plants that remain. Plants to be sent long distances are dug up when the sun is declining, care being taken to see that the leaves are dry to prevent heating, and are wrapped in bundles of 100 in damp sacking. At the receiving end the bundles are opened, the plants sprinkled with water and any with dried or abnormal roots are discarded. Planting density has an important effect on the quality of the tobacco. Close planting produces a mild tobacco of high quality and with a low nicotine percentage. A table shows the optimum planting distances for 15 varieties, local and imported. Planting out is only done in the early morning and late afternoon on sunny days. The soil should be reasonably moist.

206. BENNETT, C. W. 633.71-2.8  
Influence of contact period on the passage of viruses from cion to stock in Turkish tobacco.  
*Phytopathology*, 1943, 33: 818-22.

Histological investigations of the graft unions of Turkish tobacco have shown that it takes 2 days to complete the union of meristematic tissues and 7 days to establish contact between the phloem of stock and scion. Transmission of a phloem-inhabiting virus across the union should, therefore, be slower than that of a virus in the parenchymatous tissues. The results obtained with separation of a phloem-inhabiting curly-top virus from a strain of ring-spot and a strain of cucumber-mosaic virus through different rates of passage through the graft union in Turkish tobacco support this hypothesis. The fact that sometimes only a short-lived meristematic union, as possibly occurring between tissues of widely different species, permits virus passage may prove of great value in determining virus relationships where juice transmission fails and insect vectors are unknown. The investigations were carried out at the U.S. Sugar Plant Field Laboratory, Riverside, California.

207. MORRILL, A. W., Jr. 633.71-2.765  
The control of *Limonijs agonus* (Say) on shade-grown tobacco in Connecticut, 1937-42.  
*J. econ. Ent.*, 1943, 36: 392-5, bibl. 7.

Carbon disulphide applied after harvest by means of a weed-killer-type soil injector at the rate of one ounce every

18 linear inches in each direction to a depth of 4 inches gave a highly significant kill of the wireworm, *Limonijs agonus*. Dichloroethyl ether and naphthalene were tested but the reductions obtained were not sufficient to be of advantage to the practical grower.

208. ANON. 631.56: 633.72  
Die Sammlung hat begonnen! (Harvesting [of tea substitutes].)  
*Dtsch. Heilpfl.*, 1943, 9: 46-7.

In addition to the popular tea substitutes from blackberry, raspberry and strawberry leaves, German schoolchildren are urged to gather large amounts of lime and ash leaves to satisfy the demand for tea substitutes.

209. RABAK, F. 633.79: 581.192  
Report on hops with special reference to the determination of their alpha resin content.  
*J. Ass. off. agric. Chem., Wash.*, 1943, 26: 481-5.

A study was made of the methyl alcohol solutions of the soft resins from 6 samples of hops, containing widely different percentages of both total soft and alpha resins, by using varying quantities of lead acetate solution for precipitation of the alpha lead salt.

210. RUDORF, W. 633.841-1.523  
Deutscher Speise- und Gewürzpeffer. (German table and spice pepper.)  
*Obst- u. Gemüseb.*, 1942, 88: 45-6, from abstract  
*Forschungsdienst*, 1943, Vol. 15, abstr. p. 57.

The Erwin Baur Institute, Müncheberg, and its sub-station at Ladenburg, report promising results from their attempts to breed a native variety of pepper. It is hoped that this aim will be attained within a few years.

211. ANON. 633.85  
Frankreichs Ölfruchtbaul Grundlage der Fettversorgung. (Oil production the basis of fat supply in France.)  
*Forschungsdienst*, 1943, 15: 285-6.

In autumn 1942, 70,000 hectares were devoted to winter rape in France. In 1943 it was planned to devote 70,000 ha. to rape and turnip seed and 245,000 ha. to poppies, sunflowers and other oil seeds, excluding flax. Formerly France imported very large quantities of table oil from her African possessions.

212. ANON. 633.85  
Ausdehnung des Rapsanbaues in Belgien. (Increased rape cultivation in Belgium.)  
*Forschungsdienst*, 1943, 15: 183.

8,000 hectares of winter rape are being grown in Belgium and should yield 8,000,000 kg. of oil a year.

213. HURT, E. F. 633.85  
The sunflower as a utility crop.  
*J. roy. hort. Soc.*, 68: 333-41.

The importance of a large sunflower crop for Great Britain is stressed, the oil equalling olive oil in quality. From a detailed description of cultivation and harvesting methods the following points may be mentioned. In experiments on a big scale carried out in a number of counties 3 semi-dwarf varieties have so far been found suitable: Mars, Pole Star, and Southern Cross, of the black-, grey-, and stripe-seeded type respectively, because they take only 15-17 weeks to mature. It was shown that large heads do not give the maximum yield per acre. Furthermore, the amount of flesh they throw at the back of the head prolongs the period required for drying out and increases threshing difficulties. Highest yields were obtained from heads about 7-9 in. across where the plants were spaced 18 in. in the rows and 9 in. between the plants. The main damage to the crop being done by birds, growers should select for the type which casts its head slightly down while it ripens until it finally bends over at the neck. In small plots the leaf below the head, which lends itself to perching, should be broken off.



Sunflowers are not particular as to soil and climate, but they do not do well in acid soils or on shallow chalk. Since they require large amounts of phosphate and potash, the return of refuse to the land is recommended where fertilizers are scarce. There is a possibility that the stalks may be used for fibre production and the leaves as a source of protein.

214. (v. TSCHERMAK-SEYSENEGG, E.) 635.624:633.85  
A new oil-yielding plant: the "Tschermak"  
pumpkin having seed without integument.

Int. Rev. Agric. Rome (Mon. Bull. agric. Sci. Pract.), 1943, 34: 208T-9T.

von Tschermak-Seysenegg announced (*Wochenbl. Landesbauernschaft Südmark*, 1942, No. 17s) that he had succeeded in breeding a pumpkin the seeds of which have only a very thin coat. Oil is extracted very easily from these seeds and the presscake can be used directly for feeding. The new variety has been placed on the market under the name of "Tschermak". It has no particular requirements, but is unsuitable for cold, very compact or too sandy soils. The oil, which is tasteless after refining, is reported to be excellent for cooking and canning. The gourds, containing a minimum of 2% seeds, yielded 2,000 kg. per hectare; this is equivalent to 940 kg. oil and 650 kg. protein in the residuary presscake. Buchingen (*Wien. landw. Ztg*, 1942, Nos. 27, 29, 33, 36), who found that high temperature had a beneficial effect on oil content, obtained the following yield per hectare from Tschermak pumpkins in Styria:—fruits, 100,000 kg.; seed, 2,500 kg.; oil, 1,200 kg.; presscake, 1,000 kg.

215. KJELLANDER, E. 633.85-2: 617  
Några skadeinsekter på oljeväxter. (Some pests  
of oil crops.)

Växtskyddsnotiser, 1943, Nr. 6, pp. 1-6.

The increase in oil crop production in Sweden has been accompanied by the introduction of insect pests hitherto unknown in that country and by an alarming incidence of other insects, which hitherto could be regarded as economically negligible. Poppies and linseed are the two oil crops least attacked. The biology of the pests in question is being investigated at Åkarp, preparatory to the study of control measures. The following insects and the symptoms they cause are described:—*Ceutorrhynchus quadridens*, *Scaptomyza flava*, *Dasyneura brassicae*, *Contarinia nasturtii*. Some other insects are briefly mentioned. 8 photos illustrate the effect of the pests on their hosts.

216. HEUSER, W. 633.859  
Der Mohnbau in Niederdonau. (Poppy growing  
in the lower Danube area.)

Wien. landw. Ztg, 1941, 91: 28, from abstract  
Forschungsdienst, 1943, Vol. 15, abstr. p. 56.

Deep, warm, moderately moist, medium heavy soils, well cultivated and limed will meet the requirements of poppy plants in the lower Danube area. 4-6 kg. seed per hectare should be sown in shallow furrows. Further instructions refer to manuring, cultivation and harvesting.

217. BRANDENBURG, E. 633.859-2.19: 546.27  
Versuche über Bormangel an Mohn. (Boron  
deficiency in poppies.)

Z. Pflkrankh., 1942, 52: 56-69, from abstract  
Zbl. Bakt., 1943, 105: 478.

The experiments showed poppy plants to be very susceptible to boron deficiency, both in sand-peat cultures and under natural deficiency conditions. Symptoms are similar to those of other dicotyledons; development ceases in an early stage if the deficiency is severe, and deformation of flowers and capsules occurs in less severe cases; ovules and seedstend to decay.

218. BERGSTRÖM, I. 633.859-2.19: 546.27  
Borbrist hos oljevallmo. (Boron deficiency in oil  
poppies.)

Växtskyddsnotiser, 1942, Nr. 4, pp. 54-7.

The symptoms of boron deficiency in oil poppies, as observed by the Plant Protection Station, Stockholm, are

described and photographically illustrated. The application of 10-15 kg. borax per hectare in spring mixed with other fertilizers is recommended as a remedy. If a small area shows boron deficiency, treatment during the growing season with an aqueous solution of borax (1-1.5 g. per square metre) is suggested. The symptoms of a poppy disease caused by *Pleospora calvescens* being very similar to those of boron deficiency and deficient plants being more susceptible than healthy plants, the author advises seed treatment with one of the standard dry disinfectants.

219. REINMUTH, E. 633.859-2.4  
Weitere Beobachtungen über die parasitäre  
Blattdürre des Ölmohns. (Further observations  
on a parasitic disease affecting the leaves of  
poppies.)

Angew. Bot., 1943, 25: 300-4, bibl. 3.

Further observations on the incidence of a parasitic leaf disease of poppies caused by *Helminthosporium papaveris* (*ibidem*, 24: 273-7; *H.A.*, 12: 1410) showed that temperature conditions in June and July are an important factor for the development of the fungus, hot weather favouring the disease.

220. KÖNEMANN, E. 633.85  
Ölfruchtanbau in allen Lagen. (Cultivation of  
oil fruits under a variety of soil and climatic  
conditions.)

Siebeneicher Verlag, Berlin, 1942, pp. 96, R.M. 2.80,  
from review *Angew. Bot.*, 1943, 25: 306.

221. ANON. 633.88(72)  
Mexico cultivates drug plants.  
*Agric. Amer.*, 1943, 3: 217.

With the collaboration of the U.S. Government 10 agricultural stations have been established in Mexico and Lower California, where the cultivation of various drug plants is under trial.

222. WEHLMANN, K. 633.88  
Aufwand und Ertrag beim Anbau von Heil- und  
Gewürzpflanzen unter besonderer Berücksichtigung  
der Anbauverhältnisse in bäuerlichen  
Betrieben. (Expenditure and returns in the  
cultivation of medicinal and spice plants with  
special reference to peasant farming.)  
R. Bechtold & Co., Wiesbaden, 1942, pp. 145,  
R.M. 9.-, H. 2 of the series *Leistungssteigerung im  
Gartenbau*, from review *Angew. Bot.*, 1943, 25:  
311.

After introductory remarks the cultivation of the following plants is described in detail:—yellow mustard, coriander, caraway, fennel, marjoram, thyme, peppermint, balm, great mullein, marigold, valerian, marsh mallow.

223. STILLINGS, E. N., AND LAURIE, A. 633.88  
Cultural studies of *Atropa belladonna*.  
*Proc. Amer. Soc. hort. Sci.* for 1943, 1943, 42:  
590-2.

On plots of sandy soil at Ohio Experiment Station production of belladonna was increased by high nitrogen. Higher quantities of alkaloids were produced from plots of pH 5.5 to 6.5 than from those of higher pH.

224. HOPKINS, J. C. F. 633.88  
Stramonium collecting.  
*Rhod. agric. J.*, 1943, 40: 293-9.

Comprehensive instructions for collecting wild stramonium in Rhodesia based on experience of past years and superseding those previously officially published in Rhodesian journals before June 1942. Stramonium from the Dominion has proved to be of extra good quality.

225. ZOTOV, V. D., AND WHITE, E. P. 633.913  
Rubber production in New Zealand. Trials with  
kok saghyz.  
*N.Z. J. Agric.*, 1943, 67: 75-8.

*Taraxacum kok saghyz*, the rubber-producing plant much grown in Russia, resembles the English dandelion,

*T. officinalis*, though smaller, the leaves being in general less lobed, somewhat fleshy and bluish. It is readily distinguished by the conical knob which caps the green bracts of the flower head. The fact that the original wild species is rather a heterogeneous assemblage of plants makes the species readily adaptable to a wide range of environmental conditions. Trials are in progress in New Zealand by the D.S.I.R., the Department of Agriculture and the Cawthron Institute working in conjunction. Seed was obtained from U.S.A. and Australia. Owing to dry weather most of the directly sown seed failed to germinate. Box-sown seed was more successful. These plants were transplanted into plots when 1 month old, the spacing being 14×21 inches. One plot only was manured, receiving superphosphate 3,000 lb. per acre and tomato fertilizer 600 lb. per acre on separate sections. There was considerable diversity in form and rubber content. At Lower Hutt the plants formed perfectly flat rosettes averaging 8 inches in diameter with strongly branched roots; the plants at Alexandra had perfectly straight tap roots, those at Nelson were heavily branched. The rubber content varied from 1.1% to 2.9% in the individual roots. Circumstances prevented the trials being properly carried out, for instance sowing was much too late, but what has emerged seems to be altogether favourable as an augury for future success and experiments are continuing.

226. MARTH, P. C., AND HAMNER, C. L. 633.913-1.535.6: 577.15.04

**Vegetative propagation of *Taraxacum kok saghyz* with the aid of growth substances.**

*Bot. Gaz.*, 1943, 105: 35-48, bibl. 3.

During the winter months 1942-43 methodical experiments were carried out at the U.S. Bureau of Plant Industry Station, Beltsville, Maryland, in order to find a practical way of propagating *Taraxacum kok saghyz* vegetatively from root cuttings. This seemed desirable in view of the great variability in character and rubber content of plants raised from seed. Polarity in the root was very pronounced under greenhouse conditions. The best rooting response was obtained by setting 1 in. cuttings vertically in either sand or light soil with tops at or slightly above the level of the rooting medium. Within 4 months sizeable plants developed if the cuttings were kept at 60-65° F. for the first 21 days; higher temperatures, though speeding up callusing and top growth, rendered the roots more susceptible to rotting. The percentage of rooted cuttings could be raised by treatment with  $\beta$ -indolebutyric, naphthaleneacetic and naphthoxyacetic acids and naphthalene acetamide. Soaking the cuttings for 16 hours in the solution at a concentration of 50 p.p.m. produced the most marked increase in rooting. Improvement was also achieved by growth substance-talc dust treatments, but a solution at 50 p.p.m. was superior to dust applied at 1,000 p.p.m. Indolebutyric and naphthaleneacetic acids produced a higher percentage of rooting than either of the other two compounds. There was a difference in shape between the roots induced by indolebutyric and  $\beta$ -naphthoxyacetic acids and those developed after treatment with the two remaining growth substances, the first group tending to be long and fine, the second short and thick. Many photos illustrate the effect of all the treatments applied.

227. BORTHWICK, H. A., PARKER, M. W., AND SCULLY, N. J. 613.913: 612.014.44 + 551.56

**Effects of photoperiod and temperature on growth and development of *kok-saghyz*.**

*Bot. Gaz.*, 1943, 105: 100-7, bibl. 2.

*Kok saghyz* plants both from fields in various States and grown from seed in the greenhouse were studied in their response to different photoperiods at the U.S. Bureau of Plant Industry Station, Beltsville, Maryland. The seedlings were, furthermore, subjected to a variety of temperatures. None of the photoperiod treatments, whose range corresponded to conditions in different parts of the United States, inhibited the development of flower buds initiated

in the field. It is, therefore, concluded that plants could be moved from one region of the country to another, if this should be thought necessary for seed production purposes. Photoperiods of 12 hours or longer were found to enhance flowering of seedling plants. Observations in the field and tests on seedling plants in the greenhouse showed that low temperatures during the early developmental stages constitute a very favourable condition for early flowering. A great variability of leaf pattern was noted in the seedlings.

228. NIEDERHAUSER, J. S. 633.913-2.3

**A bacterial leaf spot and blight of the Russian dandelion.**

*Phytopathology*, 1943, 33: 959-61, bibl. 9.

A new pathogen causing bacterial leaf spot and blight of *Taraxacum kok saghyz*, viz. *Xanthomonas taraxaci* n.sp., is technically described and the symptoms as shown by the host are indicated.

229. WHITEHEAD, M. R., AND MITCHELL, J. W. 633.913

**Effects of nutrient, photoperiod, and night temperature on the development of guayule seeds.**

*Bot. Gaz.*, 1943, 105: 14-24, bibl. 7.

A large proportion of the seeds produced by the rubber plant guayule, *Parthenium argentatum*, containing immature embryos, it was thought desirable to test the effect of several environmental factors on seed production. The experiments were carried out at the U.S. Bureau of Plant Industry Station, Beltsville, Maryland. In the nutrient culture trials the most favourable response was recorded after watering with solutions of high nitrogen concentration, 192 p.p.m., whereas none of the potassium sulphur or phosphorus concentrations tested showed any effect. Magnesium and calcium, however, increased seed production at concentrations of 78 and 117 p.p.m. and 173 and 260 p.p.m. respectively. The addition of 3-5 hours of supplemental light to a 10-hour photoperiod of natural light resulted in a marked improvement in seed quality and quantity. Growing plants under various day and night temperatures led to the conclusion that relatively warm days and cool nights (45°-55° F.) constituted the most favourable condition for seed production.

230. PADLICK, M. E. 633.913

**Rubber producing plants.\***

*Libr. Bull. Col. State Coll. Libr.* 12, 1942, stencil, being *Misc. Ser. Col. agric. Exp. Stat.* 149, bibl. 108.

231. MINISTRY OF AGRICULTURE, LONDON. 635.1

**Root vegetables.**

*Bull. Minist. Agric. Lond.* 120 (2nd ed.); 1942,

pp. 16, 6d.

This bulletin 'on root vegetables' was first issued in 1939 (*H.A.*, 10:428). It has now been slightly revised by the expansion of information on the storage of carrots and other minor changes and by the omission of the illustrations and of a list of imports in 1938. These changes do not impair its practical usefulness. The vegetables dealt with are, as before, carrots, parsnips, turnips, swedes, beetroot, Jerusalem artichoke, salsify, scorzonera, celeriac, kohlrabi and skirrets.

232. CARNSER, E., AND BENNETT, C. W. 635.65: 632.8

**Name and classification of the curly top virus.**

*Science*, 1943, 98: 385-6.

The curly top virus of beet is, in the opinion of the writers, wrongly named *Chlorogenus eutetticola*, since the symptoms have little in common with those used to describe the virus family *Chlorogenaceae* and the virus is not after all transmitted by *Eutettix tenellus* in Argentina but by *Agalliana ensigera*. The name *Ruga verrucosans* is proposed for this virus, since the symptoms produced coincide with those of

\* Other than guayule or hevea.



the *Ruga* or leaf curl virus. The specific name describes the appearance of affected leaves.

233. BJÖRLING, K. 635.12: 632.3: 631.531.17  
Några betningsförsök mot brunbakterier. (Seed treatment for black rot of turnips.)  
*Växtskyddnotiser*, 1943, Nr. 5, pp. 7-11.

The black rot occurring in the leaves or roots of wild and cultivated members of the *Brassica* family is caused by *Pseudomonas campestris*. With turnips the roots especially are affected. Symptoms and transmission of the disease are described. Subsequent attacks by other bacteria were found in many cases to be more serious than the original blight. Several years' investigations at the Plant Protection Station, Stockholm, showed that treatment of turnip seeds with 2 g./kg. Upsulun and, though somewhat less effective, with 0.1% formalin, was successful in controlling the disease. In order to achieve full control it is necessary to avoid application of possibly infected compost or manure and to observe a 2-3 year rotation when including *Brassicae*.

234. TUNBLAD, B. 635.12: 632.78  
Rovfrömmottet, ett skadedjur på senapsodlingar.  
(The turnip seed moth, a pest of mustard.)  
*Växtskyddnotiser*, 1941, No. 5, pp. 69-70.

Though occurring from Scania to Uppland, the moth *Evergestis extimalis* used not to attack economic plants in Sweden. In 1941, however, the first incidence of damage to a mustard field was reported. Among other control measures mentioned is the suggestion that cruciferous weeds should be kept in check. In Southern Germany and South Russia *Evergestis* is a serious pest.

235. WARNE, L. G. G. 635.126: 632.411  
A case of club-root of swedes due to a seed-borne infection.

*Nature*, 1943, 152: 509.

WARNE, L. G. G.

An outbreak of club-root traceable to a seed-borne infection.

*J. roy. hort. Soc.*, 1944, 69: 45-7, bibl. 10.

Experiments are described which establish beyond doubt that the appearance of club-root (*Plasmodiophora brassicae*) on swedes in a Manchester garden was due to previous surface contamination of the seed. It was further established that there is a difference between varieties as to the ease with which such contamination may be removed before sowing. It is assumed that contamination occurred from contact of the fruit with infected soil either before or during harvest. Surface sterilization of the seed with hypochlorite is little more effective than washing with water alone. While it is impossible to determine what proportion of new outbreaks in clean ground can be attributed to contaminated seed, the development of suitable methods of seed sterilization would seem to be worth consideration.

236. MINISTRY OF AGRICULTURE, LONDON (K. H. JOHNSTONE). 635.25

Onions and related crops.

*Bull. Minist. Agric. Lond.* 69 (2nd ed.), 1943, pp. 24, 9d.

More than 90% of the onions normally consumed in this country before the war came from abroad. How to achieve the necessary skill in cultivation, manuring and harvesting to grow them satisfactorily here is set out in this bulletin. Attention is paid to choice of variety for particular purposes, e.g. potato onions, tree onions and the requirements of these varieties. Other crops whose cultivation is considered are shallots, garlic, romanesco, Welsh and related onions, chives and leeks, and notes are given on seed production of onions and leeks.

237. HEATH, O. V. S., AND HOLDSWORTH, M. 635.25: 581.14

Bulb formation and flower production in onion plants grown from sets.

*Nature*, 1943, 152: 334-5.

A further analysis is presented of the authors' conclusion

(*Ann. appl. Biol.*, in the press) that long days and high temperatures, conditions favourable to bulb formation in onions, are inimical to bolting and *vice versa*. From new data it is shown that long days will accelerate bolting if the temperature is low enough to delay bulbing and that the action of long days in suppressing bolting under conditions favourable to more rapid bulb formation is an indirect effect connected with the bulb development they promote. That there is a direct effect of high temperature in suppressing inflorescence mutation, quite apart from the accelerating effect on bulbing, is assumed from the fact that no primordia were found at the high temperature in either day length, though there was negligible bulbing in the short days. The rate of initiation of inflorescences is apparently unaffected by length of day, since 65% of the plants showed primordia in each day length at the low temperature. Bulbing apparently inhibits the longitudinal extension of all organs including leaves and roots. Thus, whether bolting occurs or not as the days lengthen in spring must depend on the result of a race between the processes of scape elongation and bulb formation which is determined by the diametrically opposed effects of long days, according to whether the temperature is or is not high enough for rapid bulbing. Hence the erratic bolting of onions grown from sets in various seasons and localities. These experiments were conducted with sets which had undergone a long day period the previous summer, but in a further experiment with seeds in which the day length was maintained throughout at less than 12 hours the plants flowered in 18 months without bulbing. Thus at no stage during ontogeny are long days essential either for initiation or emergence of inflorescence.

238. ODLAND, M. L., AND PORTER, A. M.

635.25 + 635.64

Vegetable rotation studies. I.

*Proc. Amer. Soc. hort. Sci.* for 1943, 1943, 42: 493-6.

*Onions*. In experiments sponsored by Connecticut University a very significantly greater increase of pink root disease was found when onions followed sweet corn. Reduction of yield can be attributed to this more than to a reduction of fertility following the removal of the corn stalks. Eliminating differences due to disease the onion crop following peppers outyielded the rotations following spinach (early crop) and beets (late crop) and in one of the two years considered the manured rotational plots yielded significantly higher than the unmanured plots. *Tomatoes*. The analysis of variance showed no significant variation between rotations in per cent. of wireworm injury or indeed in plant survival of tomatoes. The yields following sweet corn and soya bean were significantly lower than after carrots and spinach. It may be noted that in these cases cover crops were started in the autumn and ploughed under in the spring.

239. MYERS, A. 635.25: 631.531

Germination of stored onion seed.

*Agric. Gaz., N.S.W.*, 1943, 54: 398.

Seed storage tests with the onion variety Early Improved White Thunder River were continued for a third year (*ibidem*, 1942, 53: 528; *H.A.*, 13: 509). Both bagged and sealed seed kept in cold store for 3 years will germinate reasonably well, if sown immediately in the case of bagged seed or within a fortnight in the case of sealed seed after removal from the refrigerator.

240. HICKMAN, C. J. 635.25/26: 632.4

Shanking; a new disease of onion and shallot.

*Gdnrs' Chron.*, 1943, 114: 140, bibl. 1.

A new disease of onions and shallots which appears to be widely distributed in the southern half of the country is described. The leaves become yellow and shrivel (illustrated) and there is a softening of the basal tissues enclosed by the outer leaf sheath, or in older plants the bulb itself may be quite soft. The outer leaf bases sometimes appear water soaked, the roots also present a similar appearance and dry up rapidly on exposure to air. On cutting open

the plant longitudinally the swollen bases of the youngest leaves are seen to be discoloured and contracted (illustrated) or uniformly soft and water soaked. There is usually a distinct line of demarcation at the upper limit of the infection. *Phytophthora* infection is suspected. The symptoms are to be distinguished from white rot (*Sclerotium cepivorum*) by the softening of the bulb and the absence of the external white woolly fungus growth at the base. The disease may be soil borne, travelling upwards from the roots via the basal plate into the bulb. It has been found alike on light sandy soil and heavy ill-drained clay. The fact that it may develop in storage, if not recognized earlier, should be borne in mind.

241. AHLBERG, O. 635.25: 632.77

Orienterande bekämpningsförsök mot lökflugan.

(Preliminary tests for the control of onion fly.)

Växtskyddsnotiser, 1942, Nr. 4, pp. 72-4.

Calomel, chinolin, fruit tree carbolineum and arsenic were among the preparations tested for the control of onion fly (*Hyalemyia antiqua*) at the Plant Protection Station, Stockholm. Seed treatment with calomel proved the only effective method and reduced the damage from 27.5% to 4.4%. The other materials had no effect on onion fly control, but were injurious to the young plants, whereas calomel increased the number of germinating seeds by 50%. The calomel treatment followed a Danish recipe: 100 g. seed are dipped in 10 cc. starch solution, which is prepared by stirring 20 g. potato flour in 1 l. of boiling water. After that the seed is mixed with 100 g. calomel. The trials are to be continued.

242. WELLS, S. P. 635.25: 632.954

Onions v. weeds.

Fruitgrower, 1943, 97: 407.

Two acres of land known to be very dirty were prepared, rested for a week to enable the weeds to start germinating and then sown with onions. The seed was rolled in, not raked or harrowed, in order that the weeds might not be covered. A flame gun, throwing a hot flame (2,000° F.) 1 ft. in length was passed over the field. The machine was worked by a boy with a girl pumping to maintain the correct pressure of 50 lb. An acre a day was covered and all surface weeds were completely destroyed, including grass and dormant seeds on the surface. Other fields could not be treated until the onions were just bursting through the soil, the ground being then thick with grass and weeds. These were burnt off in a similar manner, including the onion growth. The onions nevertheless survived and their subsequent development was normal.

243. CAREY, M. A., AND McDONOUGH, E. S.

635.25

On the production of polyploidy in *Allium* with paradichlorbenzene.

J. Hered., 1943, 34: 238-40, bibl. 5.

The possibility that varietal instability may be produced by the use of paradichlorbenzene in controlling insect pests of onions is suggested by the ensuing stunting of onion roots at Marquette University, Milwaukee, which microscopic examination showed to be due to polyploidy.

244. KOLOBERDINA, Z. I. 635.34: 575.125

The use of heterosis for increasing the yield of cabbage. [Russian.]

Vestnik ovoščevodstvo i kartofel', 1941, No. 1, pp. 79-84.

Two cabbage varieties were sown together and allowed to open-pollinate, the seed from each being reaped separately. Different combinations of varieties gave different results, and the best showed increases of yield of up to 59%.

245. KHIMČ, R. E. 635.35: 575(47)

Cauliflower breeding. [Russian.]

Vestnik ovoščevodstvo i kartofel', 1941, No. 2, pp. 48-50.

Cauliflower breeding was started at the Gribovo Station in 1932. An examination of 14 strains showed the best to be

selection No. 1355 of the Haag cauliflower, which flowered well when grown in the open. Further selections were made for early ripening and type of head.

246. BLACKFORD, F. W. 635.34/35: 632.19: 631.415

Whiptail of cauliflowers and cabbages.

Qd agric. J., 1943, 57: 35-6.

A common disorder of cauliflowers and cabbages in Queensland, called whiptail, is described. The symptoms are shortening of the midrib and main veins accompanied by a curling and twisting of the leaf blades. Affected cauliflower plants produce no flowers and suffer, on the whole, more than cabbage plants. The cause of the trouble is high acidity and this can easily be remedied by liming.

247. LINNELL, D. 635.41: 632.8

Mosaikbränna—en virussjukdom på spenat.

(Spinach blight—a virus disease of spinach.)

Växtskyddsnotiser, 1941, Nr. 6, pp. 83-6.

The first incidence of spinach blight in Sweden was brought to the notice of the Plant Protection Station, Stockholm, in 1940 when diseased plants were sent from two places in western Scania. The damage done was serious for local growers. Inoculations of *Nicotiana glutinosa* showed the virus to be *Cucumis virus T*. The symptoms of the disease as observed on spinach are described.

248. BERGSTRÖM, S. 635.53: 632.19: 546.27

Borbrist hos selleri. (Boron deficiency in celeriac.)

Växtskyddsnotiser, 1941, Nr. 6, pp. 90-2.

The symptoms of boron deficiency in celeriac are described as similar to those of heart rot of beets. In Denmark the disorder was remedied in one instance by applying 0.75 g. of boron per m<sup>2</sup>. 3 g. per m<sup>2</sup> are considered the limit beyond which toxicity will occur.

249. BERGSTRÖM, I. 635.61: 632.3

Knippebakterios på melon m.fl. växter. (*Bacterium fascians* on melon and other plants.)

Växtskyddsnotiser, 1942, Nr. 3, pp. 42-5.

*Bacterium fascians* was found to be the causal organism of galls on melon plants in investigations carried out at the Plant Protection Station, Stockholm. The stem was replaced by gall formations of the size of a fist, shaped like cauliflowers. Malformations caused by *Bacterium fascians* on a number of ornamental plants, horse beans and strawberries are also discussed.

250. MCPHAIL, M. 635.61: 632.77

Linseed oil soap—a new lure for the melon fly.

J. econ. Ent., 1943, 36: 426-9.

Linseed oil soap solution proved to be a powerful lure of melon fly, *Dacus cucurbitae*, under glass. It was ineffective on bitter melon in the field owing to constant reinfestation. The attractive component could not be determined in these investigations, which were carried out by the U.S.A. Bureau of Entomology, but is probably a fatty acid. Cotton seed oil soap and corn oil soap were attractive but to a less extent.

251. SINNOTT, E. W., AND BLOCH, R. 635.627: 581.145.2

Development of the fibrous net in the fruit of various

races of *Luffa cylindrica*.

Bot. Gaz., 1943, 105: 90-9, bibl. 9.

The development of the fibrous network is described for a number of races of *Luffa cylindrica*, the so-called vegetable sponge. The investigations were carried out at Yale University.

252. WESTER, R. E., AND BOSWELL, V. R. 635.627

Observations on culture and handling of the dish rag gourd in Maryland.

Proc. Amer. Soc. hort. Sci. for 1943, 1943, 42: 579-84.

An account is given of the experimental cultivation of the loaf sponge gourd at the Bureau of Plant Industry Station, Beltsville, Maryland. The variety *Luffa aegyptica* gave



better quality sponges than *L. cylindrica* and was earlier and more prolific though less easy to peel. The plants were grown on trellis. [The treatment afforded to marrow should suit them in Great Britain. Ed.] A growing season of 6 months is required for a full crop.

253. AFANAS'EV, L. I. 635.63: 631.8  
The mineral nutrition of Klin cucumbers grown in glasshouses.  
*Vestnik ovoševodstvo i kartofel'*, No. 5, 1940, pp. 26-46.

Space for the roots of cucumbers grown in a glasshouse being limited, manures cannot be applied all at once at planting time, but only in small quantities at suitable stages of growth. In these glasshouse trials fertilizers were applied in liquid form at various times and in various combinations, and their effects studied in the plants. The main conclusions were that mineral manures could replace organic manures and were sometimes more effective. Their main advantage was that they were quickly available at an early stage of growth. The "trace" elements were found to facilitate the intake of N, P and K, to increase the sugar content of the cucumbers and to improve their quality. Though organic manures, notably poultry manure and night soil, were less efficiently utilized, they improved the quality of the soil. The rate at which the nutrients were taken in by the plants, as well as their movement and distribution in various parts of the plant and at various stages of growth were also studied.

254. WARE, W. M., AND GLASSCOCK, H. H. 635.63: 632.8  
Cucumber virus 1 in ridge cucumbers.  
*Gdnrs' Chron.*, 1943, 114: 212.

Injury and death of ridge cucumbers on a large scale occurring in 1943 in East Kent and other southern localities is shown to be due to cucumber virus 1, vector the aphid *Myzus persicae*. The symptoms produced are more severe in ridge than in ordinary cucumbers. Wilting and death of ridge cucumbers was common in the previous years, the injury then being attributed to the low temperatures prevalent at the time, but it now seems likely that the virus was responsible. The symptoms in brief are a marked shortening of the terminal internodes on some of the runners, the exhibiting of a greenish-yellow mottle by all the leaves of the affected runner, and the appearance of rusty brown marks along the veins of the older leaves. Varieties affected were Stockwood Ridge, King of the Ridge, and Telegraph.

255. YOUNG, J. O. 635.63: 581.163: 577.15.04  
Histological comparison of cucumber fruits developing parthenocarpically and following pollination.  
*Bot. Gaz.*, 1943, 105: 69-79, bibl. 20, being *Contr. Hull Bot. Lab.* 554.

The development of megagametophyte, embryo and seed coats of the naturally parthenocarpic cucumber variety Rollison's Telegraph was studied at the University of Chicago. Development of parthenocarpic and pollinated fruits was essentially the same, embryos and endosperm being absent in the former and the seed coats being slightly smaller than in pollinated fruits. In order to test the effect of a growth substance, transverse cuts were made through the lower portion of the floral tube and 2% indoleacetic acid in lanolin was applied to the exposed surface. When the treatment was applied 4 days before flowering apical tumours were formed and the ovules reached about half their normal size. No tumours developed after treatment at full bloom, the ovules being intermediate in size between those given pre-flowering treatment and the controls. Meiosis and megagametophyte development were not affected by indoleacetic acid application. There was a central cavity in the nucellus of unfertilized ovules of parthenocarpic fruits.

256. ANON. 631.531: 635.63 + 635.64  
New method of seed extraction.  
*Qd agric. J.*, 1943, 57: 213.

A new method of extracting the seed of tomatoes and cucumbers, which does not involve fermentation, has been discovered by an officer of the Australian C.S.I.R. Commercial hydrochloric acid at the rate of one-tenth pint per box of 25 lb. of tomatoes is added to the pulped fruit, after which the seed is washed out in the usual way. The container should be a wooden barrel or of galvanized iron protected by a quick-drying bituminous paint. Cucumbers are mechanically crushed or cut lengthwise and the flesh scraped into the container. In the latter case one-fifth pint has to be used for 25 lb. of pulp. The treatment produces a cleaner seed sample than that obtained by fermentation and improves germination because of the absence of mould spores carrying traces of flesh. By this method seed can be extracted, dried and bagged the same day.

257. RIOLLANO, A. 631.87: 635.64 + 635.63  
The value of filter press cake as a fertilizer for vegetable crops, preliminary trials with tomatoes and cucumbers.  
*Proc. Amer. Soc. hort. Sci. for 1943*, 1943, 42: 547-50, bibl. 3.

Refuse from sugar mills at Puerto Rico, known as filter press cake, applied alone or in combination with complete fertilizers increased the yield of tomatoes and cucumbers. When applied alone the increase was equivalent to that obtained with a complete fertilizer having 200 lb. each of  $NH_4$ ,  $P_2O_5$  and  $K_2O$ .

258. DECKER, S. W., AND AMSTEIN, W. G. 635.64  
Tomato production in Kansas.  
*Bull. Kans. agric. Exp. Stat.* 313, 1943, pp. 30.

A comprehensive survey of all aspects of tomato production in Kansas.

259. TURKOVA, N. 635.64: 577.15.04 + 547.313.2  
The effect of ethylene and of heteroauxins on the processes regulating growth and shape formation in plants. [Russian, English summary pp. 407-8.]  
*Isvest. Acad. Sci., U.S.S.R., Bibliog. Ser.*, 1942, No. 6, pp. 391-408.

The author studied the behaviour of tomatoes treated with ethylene and compared the effects produced with those observable in the same plants under the influence of heteroauxin. The experimental plants were (1) placed in a hermetically sealed glass chamber filled with ethylene, (2) sprinkled with a saturated water solution of ethylene or (3) treated with ethylene-lanoline ointment (paste). A pronounced epinasty of the leaves usually developed within a few hours following all the treatments with ethylene; the latter was extremely effective even with such small concentrations as 0.001 and 0.0001% and lower when the plants were placed in the gas chamber; on re-exposure to fresh air the leaves assumed, within 48-72 hours, the original normal position. The reaction was confined to the young, fully developed leaves, whereas in the old, senescent, or very young undeveloped leaves no epinasty was observed. There was a considerable increase of the amount of auxin in the base of petioles of the leaves of plants treated with ethylene. This was demonstrated by the specific effect (Went phenomenon) produced by the sections from the above tomato leaf petioles on the decapitated oat coleoptiles. The formation of adventitious roots was more rapidly induced in plants treated with gaseous ethylene in a chamber than in those subjected to the procedures described under (2) and (3). The age of the plant seemed to be of importance in regard to the rapidity of root induction, being quicker in the plants after the beginning of flowering than in young ones that have not yet reached the flowering stage. The treatment of tomato plants with heteroauxin produced similar effects, but the induction of roots necessitated the use of higher concentrations of heteroauxin than in plants treated with

ethylene. There was a marked increase in the amount of sugars and a considerable decrease in the total nitrogen content in plants maintained for 72 hours in a 0.01% ethylene atmosphere. The explanation is given that it was probably due to the stepping up of the process of hydrolysis as a result of the action of ethylene. In plants sprinkled each with 200 cc. 0.001% solutions of both ethylene and heteroauxin a rapid and considerable reduction of the ascorbic acid content occurred in the leaves; it reached only 29.5% of the original amount in 24 hours after treatment, but rose again to 70% in 120 hours when the treatment was discontinued. Similar effects, but with a somewhat smaller reduction in the original amount of ascorbic acid, were observed in the plants during the first stage of fruit ripening; the ripening of the fruit and thus, the senescence of the plants, was, however, considerably accelerated by such treatment.

260. RALPH, E. L., AND OTHERS. 635.64: 577.16  
Provitamin A and vitamin C in the genus *Lycopersicon*.  
*Bot. Gaz.*, 1943, 105: 113-5, bibl. 5, being *Paper*  
*Purdue Univ. agric. Exp. Stat.* 96.

Studies at the Purdue University Agricultural Experiment Station, Lafayette, Indiana, have shown that the species *pimpinellifolium* and *peruvianum* of the genus *Lycopersicon* are very much richer in provitamin A and vitamin C content than *L. esculentum* and all the commercial varieties derived from this species. The investigations are being continued with the object of developing varieties of high vitamin C content.

261. PARKER, M. M. 635.64: 581.162.3  
Increasing tomato yields by interplanting.  
*Proc. Amer. Soc. hort. Sci. for 1943*, 1943, 42:  
551-3.

Increased yields up to 60% were obtained by interplanting certain varieties of tomatoes over monoblock planting at the Virginia Truck Experiment Station.

262. INGRAM, J. M., STAIR, E. C., AND HARTMAN, J. D. 635.64: 631.85  
Field response of tomatoes to large applications of phosphates.  
*Proc. Amer. Soc. hort. Sci. for 1943*, 1943, 42:  
529-34, bibl. 5.

A marked response was shown on phosphate deficient soils to applications of phosphates in excess of the usual commercial applications.

263. MCCALLAN, S. E. A. 635.64: 632.3/4  
Empirical probit weights for dosage-response curves of greenhouse tomato foliage diseases.  
*Contr. Boyce Thompson Inst.*, 1943, 13: 177-83,  
bibl. 7.

When the number of greenhouse tomato foliage disease lesions is expressed as per cent. of the check, there is a linear relation between probit disease and logarithm of dose; however, orthodox probit weights are not applicable. Probit weighting coefficients were obtained empirically from 431 pairs of replicate tomato plants infected with early or late blight lesions. By the use of the linear regression equation, a highly significant regression coefficient was found between the logarithm of the weight of per cent. disease in replicate plants and the logarithm of the mean per cent. disease. Comparisons of dosage for equal response preferably should be made at the LD95 level. [From author's summary.]

264. GRIEVE, B. J. 635.64: 632.8: 581.14  
Studies in the physiology of host-parasite relations.  
4. Some effects of tomato spotted wilt on growth.  
Reprint from *Aust. J. exp. Biol. med. Sci.*, 1943,  
21: 89-101, bibl. 27.

As the result of studies carried out at the Botany School, Melbourne, quantitative expression is given to earlier

observations on the growth-depressing effect of tomato spotted wilt virus in tomato. Bronzing symptoms were found accompanied by a reduction in dry weight, height, leaf area, etc., whereas mottling occurred in less severely diseased plants. It was shown that the virus affects the assimilating tissue and destroys auxins, the latter probably by causing the production of oxidase in the infected plant. Under glasshouse conditions yield was not affected once the fruit had set. It is therefore suggested that regular spraying need not be continued until ripening; only occasional applications should be carried out after picking when vegetative growth is resumed. The possibility of reducing the spray programme in outdoor tomatoes at the period of ripening has not yet been studied.

265. MOORE, W. D., THOMAS, H. R., AND VAUGHAN, E. K. 635.64: 632.48: 631.531.17  
Tomato seed treatments in relation to control of *Alternaria solani*.  
*Phytopathology*, 1943, 33: 797-805, bibl. 16.

Both liquid and dust treatments of tomato seed with such chemicals as  $HgCl_2$ , New Improved Ceresan, Malachite Green and Euprocide dust failed to control losses from *Alternaria solani*, which are felt particularly in the seedling growing districts of the Southern States. The negative result of the tests, carried out at the Agricultural Experiment Station, Tifton, Ga., is considered to be due to the wide occurrence of the fungus throughout the area. The authors stress, however, the necessity of tomato seed treatment for the control of bacterial leaf spot and damping-off. Significant increases in germination and subsequent stand after seed treatment were observed during cool wet seasons, whilst during periods of medium to high temperature and moderate to low rainfall the liquid organic mercury and copper dust treatments were seen to depress germination to a level slightly lower than that of untreated seed.

266. KJELLANDER, E. 635.64: 632.78  
Grönsaksfytet angriper växthustomat. (*Polia oleracea* attacks greenhouse tomatoes.)  
*Växtskyddsnotiser*, 1943, Nr. 5, pp. 15-6.

During the past 4 or 5 years larvae of the noctuid moth, *Polia oleracea*, were observed to attack greenhouse tomatoes in Sweden, destroying in many cases 50% of the crop. Characteristics of the moth and its larvae are noted. The Plant Protection Station, Åkarp, having not yet completed its tests on control measures, publishes the experiences of some market gardeners, who failed to achieve results with nicotine and HCN, but secured control with 80% Kryocid. Every fruit, however, had to be wiped when picked after application of this chemical. Preliminary results at Åkarp suggest that a nicotine solution at the very high concentration of 1% with addition of a spreader may prove successful. Spraying with an arsenic compound before and after flowering is also recommended.

267. ELMORE, J. C., AND HOWLAND, A. F. 635.64: 632.78  
Life history and control of the tomato pinworm.  
*Tech. Bull. U.S. Dep. Agric.* 841, 1943, pp. 30,  
bibl. 23.

Since it was first reported in California in 1923 the tomato pinworm, *Keiferia lycopersicella*, has established itself in 9 American States, Hawaii, Haiti, Mexico and Peru, causing heavy losses, which more recently, however, have been confined to the late canning and market crops. The life history of the pest and the damage it causes—boring of small holes in the fruit resulting in decay—are described. Control measures worked out in experiments over a period of 6 seasons consist in 4 applications of cryolite diluted with talc to contain 70% fluoaluminate at the rate of 20-25 lb. per acre at 10-day intervals. The dusting should begin when the first fruits are about 1 in. in diameter. The last application should be timed after the first market picking and may, therefore, have to be delayed. If heavy infestation



is expected the treatment should be extended to young plants in the seedbed and after transplanting. Ploughing immediately after harvest and destroying plant remnants are the cultural control measures recommended.

268. THOMAS, W., MACK, W. B., AND COTTON, R. H. 635.64: 631.8

Nitrogen, phosphorus, and potassium nutrition of tomatoes at different levels of fertilizer application and of irrigation.

*Proc. Amer. Soc. hort. Sci. for 1943, 1943, 42: 535-44, bibl. 3.*

- WELLMAN, F. L. 634.8: 635.64

A new species of *Fusarium* causing vascular wilt of tomato [*F. retusum* sp. nov.].

*Phytopathology, 1943, 33: 956-8, bibl. 8.*

- WELLMAN, F. L. 635.64: 632.8

A technique to compare virulence of isolates of *Alternaria solani* on tomato leaflets.

*Phytopathology, 1943, 33: 698-706, bibl. 11.*

- LESLEY, M. M., AND LESLEY, J. W. 635.64: 631.524

Hybrids of the Chilean tomato. Sterile and fertile plants of *Lycopersicon peruvianum* var. *dentatum* Dun. (*L. chilense* Dun.) and diptoid and tetraploid hybrids with cultivated tomatoes.

*J. Hered., 1943, 34: 199-205, bibl. 11.*

269. WALKER, J. C., AND JOLIVETTE, J. P. 635.65: 632.8

Productivity of mosaic-resistant Refugee beans.

*Phytopathology, 1943, 33: 778-88, bibl. 12.*

The purpose of these experiments, carried out at Madison, Racine and Green Bay, Wisconsin, for some years was to study the productivity, pod type and canning quality of 5 new resistant bean varieties of the Stringless Green Refugee type in comparison with the mosaic-susceptible original variety, of that name. The tests showed that 4 of the resistant varieties, Idaho Refugee, U.S. No. 5 Refugee, Sensation Refugee 1066 and Sensation Refugee 1071 have retained all desirable characteristics of Stringless Green Refugee in its mosaic-free state, Sensation Refugee 1066 being even earlier in production of pods at the canning stage. Wisconsin Refugee resembled the mosaic-affected Stringless Green Refugee in that it yielded less and that the bulk of the crop matured late, but pod shape and size and canning quality were equal to those of the susceptible variety. Finally, it is suggested that a variegation occurring in Wisconsin Refugee and Idaho Refugee be removed by selection.

270. VIRGIN, W. J. 635.65: 632.8

An unusual bean disease.

*Phytopathology, 1943, 33: 743-5.*

A new disease of beans causing dwarfing and premature ripening is reported by the Idaho Experiment Station. The disease, probably a virus, does not appear to be seed borne.

271. KERR, J. A. 635.65

Navy bean production.

*Qd agric. J., 1943, 57: 202-3.*

Growers in the South Burnett are encouraged to produce navy beans the cultivation of which is briefly described.

A two-row bean cutter suitable for mechanical harvesting is illustrated in 2 photos.

272. LACHMAN, W. H., AND SNYDER, G. B. 635.653

Experiments with lima beans.

*Proc. Amer. Soc. hort. Sci. for 1943, 1943, 42: 554-6, bibl. 9.*

By starting lima beans in pots and carefully transplanting them out of doors after the weather had warmed up a crop was picked 19 days earlier than the outdoor seeded crops and with an increase in yield of 45%.

273. RAW, A. R. 635.655

The soya bean.

*J. Dep. Agric. Vict., 1943, 41: 477-80.*

In his description of the cultivation of soya beans the author names areas in Victoria likely to be suitable for growing the crop. The fertile river valleys of Eastern Gippsland and the North-East offer the greatest chance of success; but it cannot be expected that soya beans will displace the well-established summer crops of those districts. It is suggested that the crop could be produced in Southern Gippsland, portions of the Western District and the irrigation areas. Mammoth Yellow has proved satisfactory in Victoria.

274. WEISS, M. G., AND OTHERS. 635.655

Vegetable soybeans.

*Bull. la agric. Exp. Stat. P.39, 1942, pp. 382-95.*

Among soybean varieties collected in Japan 89 were of the vegetable type. After establishing the fact that vegetable soybeans in the green-bean stage are a desirable human food 3 varieties were selected for their performance at Iowa Agricultural Experiment Station:—Sac, very early; Kanro, mid-season; Jogun, late. The two latter varieties yielded about 80% of the seed produced by field varieties, Sac yielding less because of its earliness. Vegetable soybeans must be harvested upon maturity in view of their tendency to seed shatter. The proper green vegetable stage, which is reported to be of excellent flavour and palatability, far superior to that of field varieties, extends from the time the pods are approximately two-thirds filled until they attain maximum size, but before they begin to turn yellow. The canned product, improved by the addition of sugar, is also expected to find a place in the market. Vegetable soybean varieties will give a heavier crop than lima or snap beans. It is recommended that the pods should be parboiled for 5 minutes prior to shelling of the green beans.

275. MORSE, W. J. 635.655

Soybean variety registered.

*J. Amer. Soc. Agron., 1943, 35: 834-5.*

The first soybean variety to be registered under the co-operative agreement between the Bureau of Plant Industry and the American Society of Agronomy is Boone, a pure line selection from P.I. 54563-3<sup>a</sup> made by the Missouri Agricultural Experiment Station, Columbia.

276. ANON. 635.655

Soya beans.

*Proc. agric. Soc. Trin. Tob., 1943, 43: 213-4.*

In Trinidad Yellow Mammoth (Venezuelan Yellow) soya bean, a culinary variety and Ootootan, a forage sort, alone have grown well of the many varieties introduced. The rainfall is probably too high and with cultivation still in the hand-forking stage so are the expenses. Under Trinidad conditions the seeds quickly lose viability and in consequence the crop should be grown in quick succession. A main factor for success is that the seeds should ripen during a dry period or they may rot, and in Trinidad this is often difficult to contrive on a commercial planting. Soil inoculation does not appear to be generally necessary, but the sprinkling over a new area of a little soil from an area where the root nodule bacteria have been noticed is a safeguard.

277. PROBST, A. H. 635.655

Border effect in soybean nursery plots.

*J. Amer. Soc. Agron., 1943, 35: 662-6, bibl. 5.*

The border effect in 16 ft. long soybean nursery plots could be eliminated by the removal of a foot section from each end at maturity. At a distance of 30 in. between the rows the yields were on the average 16% higher when this operation was not carried out.

278. ROBERTSON, D. W., LUTE, A. M., AND KROEGER, H. 635.655

Germination of 20-year-old wheat, oats, barley, corn, rye, sorghum and soybeans.

*J. Amer. Soc. Agron., 1943, 35: 786-95.*

The viability of Wisconsin Black soybeans dropped sharply after the 6th and reached nil by the 14th year.

279. GERM, H. 635.655: 581.142  
Die Keimfähigkeit der Sojabohne. (The germinating power of the soya bean.)  
*Forschungsdienst*, 1943, 15: 68-78, bibl. 3.  
Viability tests at the Agricultural Experiment Station, Vienna, revealed that soya bean seeds are particularly hygroscopic. Air-dry shelled seeds suffer more severely from soaking than other shelled seed. The testa provides considerable protection against such damage, but only if it is uninjured. Under normal conditions, however, fissures and cracks in the seed coat occur frequently. Testae injured in such a way cease to protect the seeds from damage due to soaking in rain water in the soil. The ill effect of soaking is limited to seeds with a low water content. Seeds with a higher moisture content are not harmed by soaking, even when shelled. Viability counts should take into consideration the abnormal (broken) seedlings which are recognizable only after removal of the seed coats.
280. ANON. 635.655: 577.15.04  
Hormone beschleunigen die Reife der Sojabohne. (Hormones hasten the maturity of soya beans.)  
*Forschungsdienst*, 1943, 15: 179.  
By placing seedlings in a nutrient solution to which hormones had been added it was found possible at an institute at Kischinew, Rumania, to shorten the life cycle of the soya bean. It is hoped that in further investigations a method will be evolved which will allow it to reach maturity within 3-4 instead of 5-6 months. In that case two crops could be grown in a season.
281. FISCHER, R., SAMMET, K., AND POSCHENRIEDER, H. 635.655: 631.8  
Beziehungen zwischen Nährstoffaufnahme, Knöllchenbildung und Tätigkeit der Knöllchenbakterien bei der Sojabohne unter dem Einfluss wechselnder Düngung. (Relations between absorption of nutrients, nodule formation and the activities of nodule bacteria in soya beans under the influence of various fertilizers.)  
*Bodenk. u. PflErnähr.*, 1942, 27: 181-97, from abstract *Zbl. Bakt.*, 1943, 105: 476.  
The results of previous experiments (*Zbl. Bakt.*, 1940, 102: 389-96, 425-32) on the effect of potash and phosphoric acid supply upon the development of the soya bean were confirmed. Predominance of phosphoric acid favoured the formation and number of nodules as well as the nitrogen content of all parts of the plant, whilst an unbalanced increase of potash caused decrease both of nodule number and weight and of nitrogen content. Furthermore, large potash supplies were utilized to a relatively less degree than smaller applications.
282. AYERS, A. D., WADLEIGH, C. H., AND MAGISTAD, O. C. 631.415.3: 581.14: 635.65  
The interrelationships of salt concentrations and soil moisture content with the growth of beans.  
*J. Amer. Soc. Agron.*, 1943, 35: 796-809, bibl. 9.  
The effect of various soil moisture treatments upon plant growth in saline soils with beans as test plants was studied at the Salinity Laboratory, Riverside. Thirty-six 10-gallon steel drums were filled with soil. There were 4 salt treatments, viz. nil NaCl, 1,000, 2,000 and 4,000 p.p.m. added NaCl on a dry soil basis, and 3 irrigation schedules, viz. the containers were irrigated when (1) small amounts, (2) moderate amounts of the available moisture had been utilized by the plants and (3) when the plants were wilted by mid-morning. Both increase of moisture tension and of NaCl applied by themselves resulted in a progressive reduction of bean growth and yield. The relative effect of NaCl on the reduction of yield was greater at the higher soil moisture tensions. Although the osmotic concentration of the 1,000 p.p.m. cultures was lower than that of the high tension "no salt" series, the reduction in yield was greater in the former. This observation is thought to suggest that more attention ought to be paid to the osmotic relationship of soil solutions in non-saline as well as in saline soils. Such factors as the inhibiting effect of concentrated salt solutions on root growth and on the production of new roots, which will reduce their absorptive capacity by preventing the roots from reaching areas of undepleted moisture, should also be considered.
283. LARSON, R. E. 635.656  
Interrelation of varieties and spacing on early and total yield of market peas.  
*Proc. Amer. Soc. hort. Sci. for 1943*, 1943, 42: 565-8, bibl. 1.  
Dwarf peas may be planted 2 inches apart without reduction of yield. Maximum early and total yield is obtained with medium-tall peas planted 1 inch apart. Decreasing spacing or doubling the quantity of seed had no practical value at Rhode Island Experiment Station.
284. BROVTSYN, A. N. 635.656: 575.243  
Variation in pea varieties and their admixtures. [Russian.]  
*Vestnik ovoščevodstvo i kartofel*, 1941, No. 2, pp. 27-38.  
The American Wonder pea was introduced into the U.S.S.R. in 1920 and was subjected to constant selection for yield. Numerous references in Russian literature are cited which show that the variety was more variable than most other peas, late maturity, albinism and the formation of rounded instead of wrinkled seeds being among the variations most commonly observed.
285. DOUGLASS, J. 635.656: 664.84.656  
Green peas for canning. A new industry firmly established.  
*Agric. Gaz. N.S.W.*, 1943, 54: 399-403.  
Experience gained in the production of canned green peas for the forces in New South Wales indicates that the canned product is superior to the home-cooked article and is, therefore, likely to maintain its place in peacetime. The cultivation of the crop, which to grow successfully requires a high standard of mechanization, is described in detail.
286. SHERWIN, R. A. 635.656  
Standards for blue peas.  
*Tasm. J. Agric.*, 1943, 14: 74-7.  
The quality of Tasmanian-grown blue peas should be improved to succeed in the overseas market. The permanent standards for the two grades and the methods of sampling are described. Defects are caused by crinkling, softness or bleaching. Crinkling and softness both arise from too early harvesting and bleaching from harvesting when the crop is overripe. Mustiness can develop from bagging the peas in a damp condition, which may arise if they are threshed when wet in the stack. A serious fault in Tasmanian peas is the presence of inferior foreign varieties which detract from the appearance when cooked. Discoloration by contact with the soil and the admixture of foreign matter is occasionally found. Preventive measures for these defects are suggested.
287. NORRIS, D. O., AND HUTTON, E. M. 635.656: 632.8  
Pea mosaic with special reference to its effect on yield of seed.  
*J. Coun. sci. industr. Res. Aust.*, 1943, 16: 149-54, bibl. 3.  
The war having made the production of garden pea seed in Australia a necessity, the effect of common pea mosaic on seed yield was studied at Canberra. Seedling infection of the variety Greenfast reduced the yield by 17%. The vitality of seed from infected plants was only slightly inferior to that from healthy plants. Considering also growing conditions in Australia the authors come to the conclusion that pea mosaic will not present a threat to the production of garden pea seed on a large scale.



38. ANTONOVA, R. P. 635.656: 632.4  
Anthraxnose in peas.  
*Vestnik ovoščevodstva i kartofel'*, No. 5, 1940,  
pp. 51-5.

The author describes the outward as well as the microscopic appearance of *Colletotrichum pisi*, which attacked the aerial portion of a crop of peas at the Omsk Agricultural Experimental Station. Attempts to infect the plants artificially met with difficulty. Rainy weather was observed to favour the spread of the disease. Too little is known about the disease as yet to enable any definite measures for combating it to be recommended, though it is believed that the removal of crop residues, a suitable rotation, and spraying with a copper compound in summer may prove effective.

39. SCHROEDER, H., AND BRAUN, H. 577.16: 635.937.34

*Die Hagebutte, ihre Geschichte, Biologie und ihre Bedeutung als Vitamin C-Träger.* (The rose-hip, its history, biology and significance as a source of vitamin C.)  
Wiss. Verlagsges., Stuttgart, 1941, pp. 52, RM 2.50,  
from review *Angew. Bot.*, 1943, 25: 308-9.

*Rosa canina* and its varieties with an average vitamin C content of 1,062 mg.% and up to 93% fruit pulp and *Rosa rugosa* are recommended as most suitable for large-scale plantings. Vitamin C content is highest in the still hard fruits at the start of ripening. Storage for any length of time is not advisable, but if necessary the fruits should be carefully dried and then kept in the dark at a low temperature and in well-sealed containers. In view of the significance of hips for human nutrition roses were planted along some motor roads and large plantations were started in several districts. In 1940 1.2 mill. kg. of rose hips were collected in Bulgaria as against 180,000 kg. in Germany.

90. ARGENTINA, MINISTRY OF AGRICULTURE. 635.615

*Sandia (Citrullus vulgaris).* (Cultivation of the water melon in Brazil.)  
*Bol. Frut. Hort.*, B. Aires, 1942, 7: 78: 3-4,  
reprinted from *Alm. Minist. Agric.*, B. Aires, 1941, 16: 351-3.

ARGENTINA, MINISTRY OF AGRICULTURE. 635.61  
Melon (*Cucumis melo* L.) (Cultivation of melon in Brazil.)  
*Bol. Frut. Hort.*, B. Aires, 1942, 7: 71: 3-4,  
reprinted from *Alm. Minist. Agric.*, B. Aires, 1941, 16: 339-41.

ARGENTINA, MINISTRY OF AGRICULTURE. 633.842  
Pimiento (*Capsicum annum*). (Cultivation of pimiento in Brazil.)  
*Bol. Frut. Hort.*, B. Aires, 1942, 7: 73: 2-4,  
reprinted from *Alm. Minist. Agric.*, B. Aires, 1941-16: 342-4.

LUDWIGS, K., AND SCHMIDT, M. 632.3/8: 635.1/7+633.85

*Die Krankheiten und Schädlinge der Gemüse pflanzen, der Küchenkräuter und wichtigsten Arzneipflanzen.* (Diseases and pests of vegetables, herbs and the more important medicinal plants.)

Trowitsch u. Sohn, Frankfurt a/O, 1942, pp. 190 (2nd ed.), RM. 6.0, from review *Angew. Bot.*, 1943, 25: 306.

BRAKE, J. 631.531.17  
Legume seed inoculation. Effects of lime at Inverloch.

*J. Dep. Agric. Vict.*, 1943, 41: 455-6.  
ALBRECHT, H. R. 631.531.17  
A method for inoculating small lots of legume seed.  
*J. Amer. Soc. Agron.*, 1943, 35: 914-7.

ROMNEY, V. E. 632.754: 635.65  
The beet leafhopper and its control on beets grown for seed in Arizona and New Mexico.  
*Tech. Bull. U.S. Dep. Agric.* 855, 1943, pp. 24, bibl. 11.

COOK, W. C. 635.65: 632.754  
Evaluation of a field-control program directed against the beet leafhopper.  
*J. econ. Ent.*, 1943, 36: 382-5, bibl. 6.

## FLOWER GROWING

91. STUART, N. W. 635.939.98: 612.014.44  
Controlling time of blooming of chrysanthemums by the use of lights.  
*Proc. Amer. Soc. hort. Sci. for 1943*, 1943, 42: 605-6.

Interrupting the dark period with 30 to 60 minutes of light at midnight delayed flowering in chrysanthemums at Beltsville without reduction in quantity or quality for 2 to 3 months after normal flowering period. The treatments were started on 1 August. The method is far cheaper than the older one of prolonging the light season for 2 or 3 hours at the end of the day. The extra lighting should not be continued after bud formation and it should start at least 30 days before the first visible sign of a bud.

92. MARTH, P. C. 635.937.34: 631.563  
Retardation of shoot development on roses during common storage by treatment with growth-regulating substance.  
*Proc. Amer. Soc. hort. Sci. for 1943*, 1943, 42: 620-8, bibl. 3.

Application of a vapour treatment of  $\alpha$ -naphthylmethylacetate at the rate of 0.3 grams per 1,000 cu. ft. for 16 hours at 70° F. gave excellent control of shoot growth of winter stored roses. All rose varieties do not respond equally well. The vegetative buds of other plants stored in the same room are also likely to be retarded.

293. ALLEN, R. C., AND ASAI, G. N. 635.937.34: 632.111  
Low temperature and desiccation as factors in winter killing of garden roses.  
*Proc. Amer. Soc. hort. Sci. for 1943*, 1943, 42: 611-9, bibl. 3.

Rose canes completely killed by low temperatures appeared water soaked on thawing but later the tissue turned brown. The tissues were killed by cold in non-hardened rose canes in the following order:—inner cortex, phloem, cambium and outer cortex, xylem rays and pith. After hardening pith and inner xylem were the first to be injured while the outer cortex was the most resistant. Large ice masses greatly distorting the tissues were observed in stems frozen at low temperatures. Ice crystals formed in the intercellular spaces gradually increasing in size as the temperature was lowered, withdrawing water from the surrounding tissues.

294. (BRITISH CARNATION SOCIETY.) 635.936.69: 663.61: 581.084.1  
Nutrient solution culture of carnations in sand.  
*Fruitgrower*, 1943, 96: 272, 276.

At the quarterly meeting of the British Carnation Society in London, October 1943, the cultivation of carnations in sand plus added nutrient salts was discussed. Mr. F. Hicks, Wokingham, said he had successfully grown carnations in sand beds. The nutrients were supplied by sprinkling them

on the top and watering in. One advantage of his method was that no expensive apparatus was required. Comparable beds of soil and of peat were laid down alongside and careful records were kept. During 20 months the sand received 77 lb. of chemicals at a total cost (1943) of 30s.; the soil bed received 102 lb. of artificials plus stable manure at a total cost of 70s. At first, owing to a tendency of the coarse sand to dry out, the soil bed produced the greater number of flowers, but after correction of this fault by the addition of fine sand the sand bed drew well ahead in production. Further advantages were a 25% increase in keeping quality, the abolition of weeding and a complete control over the plants. Mr. Stevenson, Hillingdon, corroborated as to improved cropping and keeping quality. Mr. S. R. Mullard, Egham, who had been working in conjunction with Professor Stoughton, Reading University, on sub-irrigation methods, said that lack of iron salts and minor salts, which was a problem, had been got over by putting these salts into the tanks at the moment of switching on the pumps. Professor Stoughton said that with the sub-irrigation method there was no soil-borne disease. Replying to Dr. W. G. Templeman, Jealott's Hill Research Station, he thought that the fact that the decaying portion of the old roots could not be extracted from the sand when replanting was immaterial. In gravel sub-irrigation the crops constantly improved. Soilless culture was worth serious consideration as a commercial proposition.

295. ALLEN, R. C. 635.937.17: 581.175.11  
Influence of aluminum on the flower colour of  
*Hydrangea macrophylla* DC.  
Contr. Boyce Thompson Inst., 1943, 13: 221-42,  
bibl. 28.

Trials showed conclusively that the blue colour of hydrangea flowers is due to the presence of aluminium in the flower tissue. Iron compounds under trial only produced a dark unnatural greenish-blue colour.

296. KRAMER, P. J., AND WETMORE, T. H. 635.976.4: 632.111  
Effects of defoliation on cold resistance and  
diameter growth of broad-leaved evergreens.  
Amer. J. Bot., 1943, 30: 428-31, bibl. 7.

A series of experiments are described from Durham, North Carolina, by which it is shown that the leaves of evergreen shrubs make an essential contribution to the plants during winter, probably in the provision of carbohydrates. The old leaves also contribute considerable food to the plant during their second summer and their removal in these trials reduced stem diameter growth in all but one of the species

used. Autumn defoliated plants were mostly winter killed, the survivors being in poor condition except for 3 *Eleagnus pungens* which were unaffected. Spring defoliated plants were not affected by cold but showed reduced diameter growth. The other varieties used were *Camellia japonica*, *Prunus laurocerasus*, *Ligustrum lucidum* and *Osmanthus aquifolium*.

297. SANDER, P. 635.939.98  
*Chrysanthemen, ihre Beschreibung, Kultur und  
Züchtung.* (Chrysanthemums: description, culti-  
vation, breeding.)  
P. Parey, Berlin, 2nd ed., 1942, pp. 93, RM. 3.60,  
from review *Forschungsdienst*, 1943, Vol. 15,  
abstr. p. 19.  
GRIEVE, B. J. 635.937.34: 632.8  
Further observations on rose wilt virus.  
Reprinted from *Proc. roy. Soc. Victoria*, 1942,  
54: 229-38, bibl. 9.  
STUART, N. W. 635.935.722  
The influence of storage temperature on forcing  
performance of Creole Easter lilies.  
*Proc. Amer. Soc. hort. Sci. for 1943*, 1943, 42:  
597.  
EMSWELLER, S. L., AND PRYOR, R. L. 635.935.722

Flower development in Creole Easter lilies stored  
at various temperatures.

*Proc. Amer. Soc. hort. Sci. for 1943*, 1943, 42:  
598-604, bibl. 4.

BEAL, J. M. 635.935.722: 581.163  
Histological studies on parthenocarpic fruits of  
*Lilium regale* induced by growth substances.  
*Bot. Gaz.*, 1943, 105: 25-34, bibl. 4.

SMITH, F. F. 635.944: 632.73  
Substitutes for tartar emetic and brown sugar in  
the control of gladiolus thrips.  
*J. econ. Ent.*, 1943, 36: 445-52, bibl. 10.

CREAGER, D. B. 635.936.69: 632.8  
Carnation mosaic.  
*Phytopathology*, 1943, 33: 823-7, bibl. 7.

MCDANIEL, E. J. 631.544: 632.77  
Insects infesting house plants. Part IV. The  
greenhouse white fly, *Trialeurodes vaporariorum*,  
a pest of house plants.  
*Quart. Bull. Mich. agric. Exp. Stat.*, 1943, 26:  
22-3.

## CITRUS AND SUB-TROPICALS

298. ANON. 634.3(54)  
Citrus growing areas in India.  
*Ind. Fmg.*, 1940, 1: 559.  
The important centres of citrus cultivation in India are the  
Punjab, Bombay, Central Provinces, Berar, Assam, Madras.  
The total area under various kinds of citrus fruit is given  
for 18 Provinces or States, Madras leading with 22,870 acres.  
299. DIMITRI, M. J. 634.322(82)  
Razones climáticas de la distribución geográfica  
del mandarino en la Republica Argentina.  
(Influence of climate on the geographic distribution  
of mandarin oranges in Argentina.)  
*Alm. Minist. Agric., B. Aires*, 1941, 16: 113-8, bibl. 4.

According to Ackerman\* the mandarin orange (*Citrus nobilis* Lour.) can support a minimum temperature of about -8° C. and the optimum temperature conditions for successful growth range from 20 to 30° C. Considerable moisture is required, namely from 50 to 95 inches annually with a minimum of 2 inches per month during the growing season. These conditions of temperature obtain over a

\* Ackerman, E. A. Influences of climate on the cultivation  
of citrus fruit. *Geogr. Rev.* 1930, N.Y., 1938, 28: 289-302.

large part of the mandarin growing districts in Argentina, but the rainfall is not so great. Ackerman's figures would seem to be unnecessarily high. A map shows the distribution of the mandarin orchards and also shows, if the isotherms are studied, that there are apparently many suitable areas in which citrus could be grown commercially, but at present is not.

300. KHAN, M. A. 634.3-1.541.5  
The Punjab. Citrus budding experiments.  
*Ind. Fmg.*, 1942, 3: 153-4.

Reviewing some activities of the Punjab Agricultural College, Lyallpur, the author deals, among other subjects, with experiments on citrus budding carried out during recent years. A comparison of the American "with wood" and the Indian "without wood" methods showed that the common Indian practice consistently gave a higher percentage of success (25.5%). By using the "with wood" method the budder inserted 25% more buds in the same time. The American method was found superior if applied to immature bud wood. It could also be employed successfully in budding kaghzi nimbo, so far propagated by layering or from seed.



01. ANON. 634.3-1.541.5  
**Selected citrus buds.**  
*Agric. Gaz. N.S.W.*, 1943, 54: 312.  
 Under the aegis of the Department of Agriculture the Co-operative Bud Selection Society Ltd. supplied nurseriesmen in New South Wales with buds from selected citrus trees. 106,700 trees arising from those buds should be available to growers during the 1943 season.
02. PARKER, E. R., AND BATCHELOR, L. D. 634.31-1.8  
**Effect of fertilizers on orange yields.**  
*Bull. Univ. Calif. agric. Exp. Stat.* 673, 1943, pp. 39, being *Pap. Riverside Citrus Exp. Stat.* 466.  
 The paper reports results of the 6 most recent fertilizer trials with orange trees conducted by the University of California College of Agriculture over a period of many years. The experiments with replications on plots of 7-16 trees were carried out at 6 different places under a variety of soil conditions. The reports are in the form of one progress report on a long-term experiment and 5 final summaries of other trials. The primary deficient elements were nitrogen and zinc, but organic matter was deficient also in some soils. In the Riverside experiments, covered by the progress report, the response to nitrogen applications was very marked. The most profitable doses per tree will partly depend on economic considerations since yield does not increase in proportion to the amount of fertilizer applied. The response to an application of 3 lb. per tree per year was good, but the result per unit was better with smaller applications. 1 lb. of nitrogen per year was found insufficient in the long run to maintain the supply in the soil. The following inorganic and organic fertilizers were found equally effective:—nitrates of soda and lime, sulphate of ammonia, urea, dried blood, cotton seed meal and such bulky organics as manures, alfalfa hay, cereal and bean straw. The application of organic matter supplied by cover crops or as manure proved beneficial as well. In the absence of organic matter the response to zinc treatment was particularly pronounced. This element was most satisfactorily applied by means of foliage sprays. Experimenting with the supply of organic matter, it was found important to keep the carbo-nitrogen ratio well balanced. At a low rate of nitrogen the spring application of manure as the sole fertilizer and the growing of winter crops on manured soils in the absence of other fertilizers had a depressing effect on tree yield. Bulky organic materials should, therefore, always be supplemented with concentrated nitrogen treatment. The soil containing sufficient phosphate, potash, gypsum, limestone and sulphur, no benefit could be observed from supplying these materials. The results of the 5 other experiments agree well with these findings, which proves them to be valid for a wide range of conditions. With the exception of Sudan grass cover crops were shown to be beneficial and to supply all the organic matter required.
03. ANON. 634.31-1.8  
**Manuring of citrus trees.**  
*Ind. Fmg.* 1940, 1: 558-9, bibl. 14.  
 A summary is given of the manurial principles for citrus established in orange growing countries other than India.
04. LIEBIG, G. F., Jr., VANSELOW, A. P., AND CHAPMAN, H. D. 634.3-1.811.9  
**Effects of gallium and indium on the growth of citrus plants in solution cultures.**  
*Soil Sci.*, 1943, 56: 173-85, bibl. 11.  
 Traces of gallium being present in California citrus soils the significance of gallium and indium for citrus plants was tested at the University of California Citrus Experiment Station. Root growth was slightly stimulated by the addition of 0.05, 1 or 5 p.p.m. gallium or indium, in the case of the latter at the expense of top growth. The order of toxicity of both elements is similar to that of aluminium. If gallium or indium are essential for citrus plants, concentrations of less than 0.001 p.p.m. and 1 p.p.m. in the nutrient solution and in the plant tissue respectively are sufficient.
305. "ROUGH LEMON." 634.3-1.67  
**Citrus fruit quality and irrigation.**  
*Citrus Gr.*, 1943, No. 114, pp. 6-8.  
 In the form of an interview with Mr. Mathews, officer in charge of the Citrus Research Laboratory, Addo, S. Africa, an account is given of an experiment to discover the effect of different quantities of irrigation water on fruit quality. With insufficient irrigation yields diminish and puffiness increases, but fruit quality is maintained. Over-irrigation gives higher yields, better growth, less puffiness but fruit low in soluble solids and of inferior keeping quality. The best results were obtained when each irrigation was 2½-3 inches or an annual total, including effective rainfall, of 28-30 in. per annum, the trees being slightly dried out but not wilted from February to June when they are out of bloom or fruit. Basin irrigation produced better trees than furrow irrigation.
306. CAMERON, S. H., AND HODGSON, R. W. 634.31-1.542  
**Effect of time of pruning on the rate of top regeneration of Valencia orange trees.**  
*Proc. Amer. Soc. hort. Sci.* for 1943, 1943, 42: 280-2, bibl. 3.  
**Further evidence on the effect of time and severity of pruning on the rate of top regeneration of citrus trees.**  
*Ibidem*, pp. 289-92, bibl. 4.  
 The rate of recovery is most rapid in trees cut back in spring and early summer, and least rapid in trees pruned in the autumn, the rate being inversely proportional to the severity of pruning.
307. IRRIGATION RESEARCH EXTENSION COMMITTEE, N.S.W. 634.3-2.19  
**Report on citrus decline on the Murrumbidgee irrigation areas**, 1943, pp. 13.  
 The report presents briefly the principles to be followed in meeting the serious problem of citrus decline in the M.I. area, nearly all groves being affected. The decline is attributed to excess soil moisture associated with *Phytophthora* root decay. The uncontrollable factors are recurring wet winters, unsuitable soil types which seem to predominate, even the best soils being in sharp contrast to U.S.A. successful citrus soils, and unsuitable, natural surface drainage. The controllable factors, which are the subject of advice in this report, are faulty irrigation layout and application, inadequate removal of surplus water, seepage and soil management difficulties.
308. FAWCETT, H. S., AND BITANCOURT, A. A. 634.3-2.8  
**Comparative symptomatology of psorosis varieties on citrus in California.**  
*Phytopathology*, 1943, 33: 837-64, bibl. 15, being *Pap. Riverside Citrus Exp. Stat.* 488.  
 After an extensive study of some virus diseases of citrus, carried out at Riverside, the authors suggest that psorosis A, psorosis B, concave-gum psorosis, blind-pocket psorosis and crinkly-leaf psorosis should be regarded as varieties of one virus, *Citricivirus psorosis*, the first 4 being named C. psorosis vars. *vulgare*, *anulatum*, *concavum* and *alveatum* respectively. The symptoms of the different varieties and their common features as appearing in the bark, wood, leaves, twigs and fruits are described in detail and illustrated by many photographs. Other diseases possibly due to viruses, such as the disorders of the corky-bark type and knobby bark, are also briefly dealt with.

309. BITANCOURT, A. A., FAWCETT, H. S., AND WALLACE, J. M. 634.3-2.8  
The relations of wood alterations in psorosis of citrus to tree deterioration.  
*Phytopathology*, 1943, 33: 865-83, bibl. 8, being *Pap. Riverside Citrus Exp. Stat.* 491.  
In studying wood alterations in citrus trees affected with psorosis A and B in relation to tree deterioration at Riverside the authors found that the wood vessels are clogged with gum or gumlike material when the secondary lesions appear. It is thought that the gradual extension of regions in the wood impermeable to water is responsible for the decline of diseased trees. The secondary lesions are accompanied by discoloration of the interior and disappearance of the starch in the blocked regions. Such areas as continue to conduct water, especially those next to the bark, will give normal starch reactions. In earlier stages of the disorder associated with bark scaling and primary wood lesions the passage of water is only partly impeded, the starch content remaining normal. This explains why trees show so little damage for some time as the disease develops. Evidence was obtained that the bark lesions are permeable to air and that lack of air cannot account for the discoloration of the wood. Since only tree parts directly connected with the portion bearing the secondary lesion deteriorate, it may be assumed that toxic substances are not an important factor.
310. ANON. 634.31-2.4  
São Paulo reports a new orange disease.  
*Agric. Amer.*, 1943, 3: 177.  
The rootlet rot disease, from which the orange groves budded on sour-orange stock have been suffering in the northern parts of Argentina since 1932, is now found in all the important orange centres of Brazil. The symptoms, which appear rather slowly, consist of the leaves turning chlorotic and being shed, followed in some cases by a secondary growth of very small leaves.
311. VERGANI, A. R. 634.3-2.654.2  
Un nuevo ácaro parásito de los citrus, *Anychus verganii* Blinchn. (A new mite, parasitic on Citrus.)  
*Alm. Minist. Agric. B. Aires*, 1942, 17: 197-8.  
The rough appearance and greyish tone of certain citrus foliage in the Bella Vista (Corrientes) district of Argentina led to the discovery of a mite new to science and since named *Anychus verganii* Blinchn. The mite attacks both sides of the leaves of a number of citrus varieties, having so far been taken on sweet and sour orange, lemon, lime, grapefruit and mandarin. The characteristic grey appearance imparted to the foliage is due to great quantities of exuviae. The animals live in colonies chiefly distributed along the central leaf vein and disperse rapidly when disturbed. The heaviest attacks are between February and April and cause the foliage to become leathery and slightly curled and to acquire a grey or silver appearance. Sulphur dusts and sprays have given good control. A brief description is given of the mite.
312. YUST, H. R., AND BUSBEY, R. L. 632.752: 634.3  
Influence of moisture and field dust on the susceptibility of the California red scale to HCN.  
*J. econ. Ent.*, 1943, 36: 457-60, bibl. 4.  
In laboratory experiments higher kills were obtained in HCN fumigation on wet than on dry lemons and on clean than on dusty fruit.
313. CRESSMAN, A. W., AND BROADBENT, B. M. 632.752  
Effectiveness of cubé and derris resins in a tank mix and an emulsion oil against California red scale.  
*J. econ. Ent.*, 1943, 36: 439-41, bibl. 9.  
Experiments with a tank-mix oil showed that addition of derris resins increased the mortality of the California red scale but that 1-14% of resins in oil was no more effective than 0-57%. In one type of emulsive oil, scale mortality was proportionate to the amount of cubé or derris resins in the oil over a wider range of resin concentrations. [Authors' summary.]
314. BRIMBLECOMBE, A. R. 634.3-2.76  
Citrus branch borer.  
*Qd agric. J.*, 1943, 57: 37-9.  
Life history and control of the citrus branch borer in Queensland are described. One of the measures mentioned is to plug all the vent holes, except one on the upper side of the branch, with some plastic material; a little carbon bisulphide is dropped into the open hole which is then also sealed. The developing fumes will kill the grub.
315. CALDWELL, N. E. H., AND MAY, A. W. S. 634.1/7-2.77  
Fruit fly luring investigations.  
*Qd agric. J.*, 1943, 57: 166-8.  
Fruit fly luring investigations carried out in the citrus orchards of the Maroochy district, Queensland, and on a smaller scale in citrus at Gayndah and in deciduous fruits at Toowoomba and Stanthorpe led to the recommendation of 5 formulae for trial by growers. Lure 4 ("Dribarm" preserved yeast compound, 3 level teaspoonfuls; ammonium carbonate [chemically pure], 1 level teaspoonful; tank water, 3½ pints) caught the largest number of fruit flies, but attracted also other insects in large numbers, which tended to foul the trap. Lure 5 (rind or rag of one ripe or ripening orange, about 2½ in. diameter; concentrated 18% aqueous ammonia, 6 teaspoonfuls; tank water, ½ pint) caught at least as many fruit flies as the maize meal and pollard lures, recommended as lures 1-3, and had the advantage of being specific for fruit flies. Traps should be recharged with fresh material at intervals of not more than 6 days.
316. MINTZER, M. J. 634.1/2-2.183  
Defensa de los montes frutales subtropicales contra los vientos secos. (Protection of sub-tropical orchards against drying winds.)  
*Alm. Minist. Agric., B. Aires*, 1942, 17: 307-8.  
Citrus, avocado, cherimoya and papaya orchards in Argentina suffer considerably from drying hot winds from the north. The leaves may lose from 14% to 32% of their water content and often drop. Protection can be afforded by irrigating the land when the winds exceed 6 metres per second, that is to say when sufficiently strong to lift paper from the ground or to agitate the smaller branches of the trees. There is a useful cover crop legume known as salterna which owing to its active transpiration keeps the surrounding air sufficiently humid to reduce the transpiration of the fruit trees. Windbreaks also give protection, the most suitable tree being *Schinus molle* (false pepper) common in warm countries. It has further uses in that leaves and fruits produce an essential oil, the wood is an excellent fuel and the bark contains 10% tannin. *Schinus molle* is best raised from seed. Bare root transplanting is difficult but this has been overcome at the Puerta de Dios Research Station, where these studies have been undertaken by sowing the seed in hollow bamboo sections and, when the young plants are 30 cm. high, planting them on their permanent sites without removal from the bamboo.
317. MINTZER, M. J. 631.459  
El control de la erosión en la provincia de Salta. (Anti-erosion methods in the province of Salta, Argentina.)  
*Alm. Minist. Agric., B. Aires*, 1942, 17: 417-24.  
Various types of erosion occurring in the province of Salta are discussed and the best way of dealing with them suggested. In the arid and semi-arid regions land which does not retain 18% of applied or rain water is not worth cultivating or protecting. Often land taken into cultivation gives good



results the first year and proves unprofitable later. Plant indicators of such infertile soils are often present, for instance and on which *Acacia cavenia*, *Caesalpinia praecox*, *Gourliea ecosticans* or *Flourenzia riparia* predominate can be considered poor, whereas if a good proportion of *Prosopis* sp. (a leguminous tree) occurs the land can be presumed sufficiently fertile to be put under cultivation. To prevent wind erosion these semi-arid soils, of which the province is chiefly composed, should never be ploughed when dry and are best under some permanent crop such as alfalfa. Another problem is the immobilization of sand dunes. Trials at the Puerta de Diaz Experiment Station have shown that planting these shifting banks with *Acacia macrocartha*, *A. cavenia* or *Flourenzia riparia* is a quick and effective method. Water erosion here is generally due to floodwater from torrential rain, especially on newly cleared land. Here a system of stone terracing should be quickly established and there is one better than the aboriginal one in use before the Spanish conquest. A plan of this is given. Recommendations are also made for stemming river spates.

18. KERR, J. A. 633.492  
The sweet potato.  
*Qd Agric. J.*, 1943, 57: 72-7.  
Instructions are given for the growing of sweet potatoes under Queensland conditions.

19. WOOLLEY, R. 633.85  
O tongue (*Aleurites fordii*). (Tung.)  
*Rev. Agric., S. Paulo*, 1943, 18: 169-71, 279-10.  
If the tung growing industry is to be a success in the State of São Paulo, Brazil, and its neighbours it will have to be regulated, preferably by Government action. Certain conditions essential to its success are enunciated. The author also discusses how the effects on tung can be minimized of a serious drought which shows signs of lasting for several months. It may be too late to save the crop on this occasion, but information for future use can be collected, especially on the physiological state of the fruiting branches, many of which are killed by severe drought. It is suggested that all big estates, and there are 2 million trees in São Paulo, should make meteorological records from registered instruments for study by the officers engaged on the research. Meanwhile any possible measures to conserve or supply the trees with moisture or to preserve it in the soil should be undertaken.

20. ANON. 633.85  
Production of tung oil increases.  
*Agric. Amer.*, 1943, 3: 198.  
Tung oil, which before the war was chiefly supplied by China, is now being produced in increasing quantities in Brazil, the Argentine and Paraguay. A mixed plantation of coffee and tung trees is reported to yield a larger income per acre than either of the crops grown by themselves.

21. HAMILTON, J. 633.85-1.536  
The effect of length of root, size of top and watering at planting on the growth of *Aleurites fordii*.  
*Proc. Amer. Soc. hort. Sci. for 1943*, 1943, 42: 371-4, bibl. 2.  
The treatments were A, tops and roots severely pruned, the

roots at a depth of 12-18 in. and on a radius of 6-12 in., the tops to 6 in. above ground level. B, as A but tops left intact. C, the roots with the entire fibrous systems left intact, a laborious task, tops pruned as in A. D, as C, but tops left intact. A, which is the usual method of transplanting tung in Florida where these experiments were carried out, gave satisfactory results. The only losses that occurred were in B treatment. Here 7 trees out of 10 watered at planting died and 10 out of 10 not watered. D treatment trees gave a significantly larger increase in size of trunk. It is for further trials to determine whether such a method can be worked out for commercial practice.

22. LEONARD, O. A. 633.85-1.87: 581.144.2  
Influence of sod and other factors upon the distribution of small tung roots in Ruston sandy loam.  
*Proc. Amer. Soc. hort. Sci. for 1943*, 1943, 42: 11-6, bibl. 6.

Tung roots (0.1 mm. diam.) in sandy loam under sod at the Mississippi Experiment Station compared with those of cultivated trees were more concentrated near the surface but in reduced number per given volume of soil. In both cultivated and uncultivated trees the small roots had a uniform horizontal distribution and were abundant up to 10 feet from the trunks, though more so in the cultivated trees. The subsoil lacked nitrogen and phosphorus and root growth there was only abundant where old forest trees had burned or rotted. In this sandy soil aeration was not a factor influencing distribution.

23. PAINTER, J. H., AND POTTER, G. F. 633.85-1.87  
Mulch versus cultivation in the young tung orchard.  
*Proc. Amer. Soc. hort. Sci. for 1943*, 1943, 42: 17-20, bibl. 12.

Young tung trees in soil found later to be deficient in potassium were annually mulched with weeds and *Crotalaria spectabilis* grown up the middle of the row, at the rate of 75 lb. per tree. After the third mulching the trees averaged 2.6 ft. higher, 3.6 ft. wider and 8.5 cm. greater girth measurement than unmulched trees. Their yield was 10.6 lb. of fruit against 4.6 lb.; they showed less potassium deficiency, and consequently the leaves remained longer on the trees. In view of these results and results obtained by certain private growers the mulching of young tung warrants an extensive commercial trial.

24. WARDLAW, C. W. 634.653  
Virtues and uses of the avocado.  
*Crown Colon.*, 1944, 14: 13-4.

It is emphasized that nutrition in the tropics could be substantially improved by cultivation of avocados on a large scale. The exceptional qualities of this fruit and its future possibilities, also in temperate markets, are discussed.

25. FOSTER, L. T. 634.651  
Morphological and cytological studies on *Carica papaya*.  
*Bot. Gaz.*, 1943, 105: 116-26, bibl. 11.

## TROPICAL CROPS

26. MAYNE, W. W. 633/635: 551.566.1  
Food production on estate lands in S. India.  
*Plant. Chron.*, 1943, 38: 280-2, 306-11, 320-5, 350-5, 368-70.

The article is an analysis of replies to a questionnaire, sent to estate owners in South India, inquiring into the possibilities of food production on tea, coffee and rubber plantations. Although land reserves amount to over 90,000 acres, the author comes to the conclusion after a detailed discussion of the situation that only a limited increase in food

production can be expected without impairing the main crops.

27. POUND, F. J. 63(861)  
A bird's eye view of agriculture in Colombia.  
*Proc. agric. Soc. Trin. Tob.*, 1943, 43: 191, 193, 195, 197, 199, 201, 203.

Colombia when properly developed will be one of the richest and most self-sufficient agricultural countries in the world.

328. AKAMINE, E. K. 631.531.16  
The effect of temperature and humidity on viability of stored seeds in Hawaii.  
*Bull. Hawaii agric. Exp. Stat.* 90, 1943, pp. 23, bibl. 25.  
The effect on seed viability of various relative humidities and of low temperatures as well as a combination of the two was studied at Honolulu over a period of 6 years. The results obtained are regarded as applicable to Hawaii where similar climatic conditions prevail and where the storage of seed has now become a matter of major importance. The following seeds were tested:—garden bean, maize, soybean, lucerne, rice, lettuce and *Pennisetum ciliare*. It was found that both low relative humidities of 15-45% at ordinary room temperatures of 71-80° F. and low temperatures of 45-50° F. at ordinary relative humidities of 64-73% constituted excellent conditions for longevity of stored seed. A combination of controlled humidity and controlled temperature increased viability further. Small quantities of seed are stored safely in the dry part of a family refrigerator.
329. VAGELER, P. 631.87: 551.566.1  
Grundsätzliche Betrachtungen zur Frage des Humus in den Tropen und seiner praktischen Bedeutung. (The problem of humus in the tropics and its practical significance.)  
*Tropenpflan.*, 1942, 45, pp. 3-12, 33-52, from abstract *Forschungsdienst*, 1943, Vol. 15, abstr. p. 10.  
The present position of humus investigations in temperate climates is reviewed and the humus problem in the tropics is described. Application of brown coal as an indirect fertilizer to exhausted tropical soils in the drier climatic zones should be considered, since brown humic substances increase the absorption capacity of exhausted tropical and sub-tropical brown earths.
330. FAHEY, H. N. 631.452: 551.566.1  
Soil fertility often a minor factor.  
*Proc. agric. Soc. Trin. Tob.*, 1943, 43: 207, 209, 211.  
The opinion is expressed that in Trinidad, at least, over-emphasis is placed on soil fertility as a limiting factor in the production of healthy crops. There are often factors equally important, though it is not always possible to determine them. Instances are given. The sugar apple succeeds only where the climate controls the fly attacking it. Soil fertility is in no way a determining factor. Limes which up to 1916 were highly productive in shady, humid valleys, now, because of wither-tip, only seem to yield within reach of salty sea breezes and in districts where rainfall is low, mostly on soils that were failures in cacao. Coconuts require certain conditions apart from soil fertility for success. Why does avocado fail on the Caroni geological soil series but yield heavily in the Montserrat and Manzanillo beds? The Caroni beds are deficient in phosphate and lime and Montserrat and Manzanillo are not, nevertheless phosphate and lime supplied where deficient do not here provide a remedy. Some toxic element may be present but if so it has not been discovered. The tannia\* has lately varied in yield from 16,000 lb. per acre to 1,500 lb. and eddoes\* from 22,000 lb. to 2,000 lb. according to the suitability of the soil to the crop. On quartz formations of the northern range, reputed to be one of the most infertile soils of Trinidad, and on the Siparia sands tonca bean thrives and has great longevity. On the Montserrat soil, reputed to be the most fertile, tonca bean is inferior in growth and yield. The soils giving the highest yield in tonca bean contain large amounts of iron. With heavy drainage and a definite artificial manuring scheme the stiff Talparo clays produce higher yields of grapefruit than the fertile chocolate soils of Montserrat district. Cacao
- \* *Xanthosoma* spp.
- depends for success on a combination of soil fertility, rainfall and an environment which controls thrips. Resuscitation schemes based on soil fertility alone will fail.
331. SCHABEN, L. J. 631.854  
Mexico to develop guano industry.  
*Agric. Amer.*, 1943, 3: 214-6.  
In a recent decree of the Mexican Government certain areas of the coast from the northern territory of Lower California up to the port of Acapulco have been specified as guano zones. A population of 20-30 million guano birds and an annual production of 200,000-300,000 tons of fertilizer are aimed at, an output which would surpass the production of Peru.
332. LUTHRA, J. C. 677.31.02: 589.77  
Fullers' teal in the Punjab.  
*Ind. Fmg.*, 1940, 1: 540-1.  
Trials at various altitudes have shown that the teal, *Dipsacus fullonum*, can be successfully grown at altitudes of 4,000-5,000 feet in India (Kangra and Murree hills, Punjab), the heads being equal in quality to imported European, now impossible to obtain. At higher altitudes the spikes are too soft owing to delayed ripening. The yield is at the rate of 50,000 heads per acre, the price being Rs. 50 to Rs. 100 per 1,000 against the pre-war maximum of Rs. 15. The plant is a biennial and requires 18 months to mature from seed. Cultivation is simple and India could easily be made independent of imports.
333. AKAMINE, E. K. 633.37  
Methods of increasing the germination of koa haole seed.  
*Circ. Hawaii agric. Exp. Stat.* 21, 1942, pp. 14, bibl. 7.  
Mechanical and acid scarification of *Leucaena glauca* seed increased germination from 10-15% to more than 90%. Hot water scarification produces germination in a percentage of more than 70. Acid- and mechanically-treated seed may be stored for 2 years, whilst hot water-treated seed should not be kept for more than 6 months.
334. BECKLEY, V. A. 633.5  
Some indigenous vegetable fibres.  
*E. Afr. agric. J.*, 1943, 9: 76-80.  
The following genera are dealt with in this survey of fibre plants indigenous in East Africa:—*Sansevieria*, *Musa*, *Hyphaene*, *Raphia*, *Phoenix*, *Hibiscus*, *Urena*, *Ponzolzia* and species of the family *Asclepiadaceae*. It is concluded that some fibres belonging to the categories of brush and hard fibres can be produced commercially.
335. ANON. 633.526.43  
Un descubrimiento accidental que puede revolucionar el cultivo de la yuca. (An accidental discovery which may revolutionize yuca cultivation.)  
*Agric. venezolano*, 1943, 7: 83-4: 10, reprinted from *Rev. Agric. Habana* (undated).  
Yuca stakes 4 to 5 ft. long, used to support some young egg plants, took root and produced a much larger yield in half the time taken by the young cuttings hitherto used and the meal obtained was of better quality. By the use of such stakes there is also a saving of labour since only one instead of several weedings is required, planting is effected simply by pressing the end of the stake into the ground and the plants always produce a crop which is not the case in the normal method.
336. ANON. 633.72  
Tea grown in South America.  
*Agric. Amer.*, 1943, 3: 218.  
Production of 250,000 lb. of dry tea is expected from Peruvian plantations, covering 1,200 acres in 1943/44.



337. ANON. 633.72  
Tea production in Peru.  
*Plant. Chron.*, 1943, 38: 349.  
From a statement by the Peruvian Government concerning the tea-growing campaign it is evident that tea production in Peru has increased in an extraordinary manner during the last few years. The Cuzco district is expected to produce 100,000 lb. and the Huanuco district more than 9,000 lb. tea in 1943.
338. TARABANOFF, J. 633.72  
El cultivo del té de China en Misiones. (Growing China tea in Misiones, Argentina.)  
*Alm. Minist. Agric., B. Aires*, 1941, 16: 417-22.  
The Argentina Ministry of Agriculture is encouraging tea planting in the Misiones area, especially since the export of yerba maté has been officially limited. The problems connected therewith are studied at the Estacion Experimental de Loreta. This present paper deals chiefly with the method of pruning most suitable to establish a young plantation quickly and with subsequent plucking treatment.
339. (COOPER, H. R.) 633.72-1.8  
The question of manure.  
*Plant. Chron.*, 1943, 38: 428-30, reprinted from *Assam Review and Tea News* (undated).  
The relevant portion of the same author's article, Experiments with cattle manure, humus composts and unfertilized organic waste materials (*Memor. Ind. Tea Ass.* 11, 1940; *H.A.*, 10: 1440) is here reproduced.
340. GILLET, S. 633.73  
Problems facing the Kenya coffee industry.  
*Mon. Bull. Coff. Bd Kenya*, 1943, 8: 87-8, bibl. 4.  
The article deals with a number of defects in estate management, which are thought to be responsible for the deterioration of conditions in the Kenya coffee industry. The author's main point is that the coffee tree as a forest tree thrives only on soils rich in organic matter and that the application of artificial fertilizers is wasted where this condition does not prevail. The maintenance of a high organic content has also a direct bearing on soil conservation. Farmers are urged to consider the keeping of stock and the growing of bulk crops, it being unlikely that cheap cattle or goat manure from neighbouring African lands will be available after the war. The importance of delayed pruning and of allowing the trees to recover from die-back before any pruning is carried out is re-emphasized. Severe carbohydrate exhaustion produced by heavy pruning and bi-annual bearing is indicated as the cause of large areas becoming uneconomical. In this connexion the significance of spraying for the control of leaf fall is also stressed. Many estates should decide on a planting programme at an early date.
341. MCCREARY, C. W. R.; AND OTHERS. 633.74: 581.144.2  
The root system of cacao. Results of some preliminary investigations in Trinidad.  
*Trop. Agriculture, Trin.*, 1943, 20: 207-20, bibl. 7.  
The results of preliminary studies of the root systems of cacao from several contrasted soil types in Trinidad are discussed. The excavation method was used. Relationships between thickness of rooting zone and of humic soils and between each of these dimensions and productivity of cacao were revealed. The features of the root system are different and characteristic for (1) physiologically shallow and (2) physiologically deep soils. In (1) the roots are mainly confined to the top 6 inches and take the form of a densely matted fibrous mass closely associated with leaf litter and having a long thin forked tap root and long laterals diminishing greatly in length and thickness with depth. In (2) the superficial root mat is absent, the tap root short and thick, the laterals short and produced in whorls to the full depth of the humic soil, and branching freely in tufts of fibrous rootlets evenly distributed throughout the porous soil. The fibrous rootlets develop profusely only in well-aerated organic soil or litter; they may have a special function in manufacturing a hormone essential for healthy growth of the tree. [From authors' summary.]
342. THOROLD, C. A. 633.74-2.4  
Witches' broom disease investigations. V. Large-scale experiments on direct control.  
*Trop. Agriculture, Trin.*, 1943, 20: 176-81, bibl. 6.  
Experiments on direct control of witches' broom disease (*Marasmius perniciosus*) of cacao in Trinidad by removing the brooms twice yearly on areas of 25, 40 and 80 acres in the period 1941 to 1943 were not effective in stemming the disease. The experiments are described and analysed very fully. The production of resistant varieties of cacao seems to be the only way by which the disease can be controlled.
343. BAKER, R. E. D., AND MCKEE, R. K. 633.74-2.4  
Witches' broom disease investigations. VI. The infection of flower cushions and pods of cacao by *Marasmius perniciosus* Stahel.  
*Trop. Agriculture, Trin.*, 1943, 20: 188-94, bibl. 10.  
The work of Stahel in Suriname on the pod- and cushion-infecting stages of witches' broom disease has been confirmed and amplified in Trinidad. Infections only occur during the wet season; but visible symptoms may not appear till up to 4 months later. All types of diseased cushion were produced by inoculation, results usually appearing in 3-5 weeks or the diseased flowers and shoots might not appear till the next flower flush. Swollen and indurated (infection but no hypertrophy) pods were readily produced by inoculation, but the development of the indirectly affected or parthenocarpic pods has not been satisfactorily elucidated. Cherrilles infected when less than 3 cm. in length develop into swollen or distorted pods while large cherrilles become indurated but not distorted. It has not been possible to verify by artificial inoculation Stahel's statement that pods can be infected when more than half grown but only develop lesions in the shell. [From authors' summary.]
344. RUEST, C. 633.73-2.76  
Gorgojo del cafe no hay en Guatemala. (The coffee borer beetle [*Stephanoderes hampei*] is not found in Guatemala.)  
*Rev. agric., Guatemala*, 1943, 20: 13-5, 21.  
An account is given of the coffee borer *Stephanoderes hampei*, known locally as the Brazil borer, and it is shown that the pest is not found in Guatemala and that if it obtained entry it could not survive in the dried beans. The reason for the article appears to be that Mexico has extended her regulations of 1927 prohibiting the import of any part of the coffee plant as a precaution against the borer to cover coffee in transit over the Mexican railways from the Central American Republics to U.S.A. Apparently this route has only recently been established and the action of the Mexican Government will considerably hamper the coffee export northwards of its neighbours though not, of course, its own.
345. FERNANDO, M. 633.88.32.491  
The influence of manuring, spacing of hills and seedling number per hill on the yield of castor.  
*Trop. Agriculturist*, 1943, 99: 3-12, bibl. 3.  
The influence of manuring, spacing of hills, and seedling number per hill on the yield of castor (*Ricinus communis*) was studied at the Experiment Station, Anuradhapura, Ceylon. Application of 20 tons of dung did not increase the yield, but 10 tons increased earliness. The soil was a chocolate brown loam deficient in organic matter and nitrogen. The manuring effects may have been obscured by a basic dressing of 5 tons of compost per acre. Spacing tests indicated that performance is a function of plant density, yield declining in proportion to increase in density beyond the most favourable distance. Spacing the hills 5 ft. by 5 ft. and allowing 1 plant to each hill was found to

be the optimal distribution. Future experiments will have to investigate the effect of growing 2 plants per hill at a distance of 10 ft. by 5 ft. with a leguminous cover crop between the rows. The beneficial influence of the wider spacing was also reflected in the vegetative growth of the plants, thickness of stem serving as a criterion of vigour, and in earliness. The Department of Agriculture aims at making Ceylon self-supporting in castor by devoting 1,600 acres to the crop.

346. ANON. 633.88.51

Wild *Cinchona* found in Ecuador.

*Agric. Amer.*, 1943, 3: 218.

The report of the survey conducted by the Ecuador Development Corporation places the number of wild quinine-bearing trees at 10 million.

347. RUBBER RESEARCH SCHEME (CEYLON). 633.912

Density of planting and thinning out.

*Advis. Circ. Ceylon Rubber Res. Scheme* 19, 1942, pp. 3.

Since there is a great variability in yield even among clonal seedlings of *Hevea* the necessary selection for thinning out to secure the accepted stand of 120-130 trees to the acre should be done by test tapping as soon as 80% of the trees have attained a girth of 12 in. at a height of 20 in. from the collar, a stage normally reached 3½-4 years from planting. The methods of making the test cut is such that the slope will be correct for normal tapping in due course. The test tapping continues daily for 10 days, the 6th-10th days only being recorded. All poor yielders cannot be removed or the stand would be most uneven. The trees are therefore reviewed in small groups and the worst of each group removed. Clonal seedlings giving exceptionally high yields should be kept under permanent observation as possible future parent trees for new clones. Planting at higher densities than the normal pre-thinning 250 might prove profitable, but with very high densities thinning must be done in 2 stages or growth will be retarded. There is a close correlation between girth and yield in clonal seedlings so that the first thinning may be done on girth at 18 months. The same applies to budded trees of the same clone and for them test tapping is unnecessary.

348. (VISWANATH, B.) 633.913

*Cryptostegia grandiflora*. A war-time source of vegetable rubber.

*Plant. Chron.*, 1943, 38: 384-5.

The article is a review of B. Viswanath's preliminary account\* of investigations on *Cryptostegia grandiflora* carried out by a team of workers at the Imperial Agricultural Research Institute, New Delhi. The plant, a deciduous shrub, grows under a great variety of conditions in India. Its rubber content is substantial and of good quality, though not so high as that of *Hevea*. The most economical method of tapping by clipping is tapping every third day, 50-70% of the yield being obtainable by the collection of plugs. Plant material is readily raised from seed. Under present conditions rubber production from *Cryptostegia* would have to be undertaken by the Government. Experience in tea plantations suggests that a study of pruning methods might result in a less costly system of tapping. It is also suggested that vegetative propagation, though difficult, should be employed for selection of high-yielding strains.

349. SYMONTOWNE, R. 633.913

*Cryptostegia* research in Hawaii.

*India Rubber World*, 1943, Vol. 108, Nos. 2 and 3, summarized in *Trop. Agriculture, Trin.*, 1943, 20: 195-7.

The planting of 100,000 acres of the rubber-bearing *Cryptostegia grandiflora* has been entrusted by the government to the Société Haitiano-Américaine de Développement Agricole (SHADA). An experiment station has been

established near Gonaïves on the west shore of the island. *Cryptostegia* in Haiti, originally an escape from a private garden, flourishes under a wide range of climatic conditions, has no soil preference and grows faster than any known rubber plant. The root system is as long as the top growth and can descend at least 10 ft. underground for water. Seeds are very viable and from 85% to 90% will germinate even after lying dormant in dry soil for 8 months. It does not reseed easily in areas of high rainfall. Depth of coverage when sown has an important effect on germination the optimum being from ½ to ¾ inch. When well watered germination is complete in 3 days and at a year old the plant may be 14 ft. high. The plant forms two kinds of stems, one bears the fruits, the other, of tendril-like character known as a tipping whip (T-whip), supplies the rubber. This is obtained by cutting back one inch of the shoot daily, starting at the second internode from the top, and collecting the rubber from the cut ends. Every vine has 1 to 3 stems that must be tapped daily, which on SHADA's 100,000 acres would work out at 1 to 3 billion stems a day. It is on the solution of this major problem of collection that the whole success of *Cryptostegia* as a source of commercial rubber depends, for an extremely simple, low cost coagulating and sheeting process has been developed at Gonaïves which seems entirely adequate. In the tapping system at present under trial wooden posts serving for 8 or more plants are set up at intervals between the rows. The tips, all of which develop on the north side, are brought down and held in place by a rack or clamp on the top of the post, conveniently exposed to the tapper's knife. Small vessels hung on the post catch the dripping latex. The rubber plugs which have formed over the cut surfaces of the previous day are collected at this time. One of the most pressing problems is the provision of clamps which will fulfil a number of essential conditions which are mentioned. The numerous other problems arising are briefly outlined. *C. grandiflora* with the highest rubber content and whip-forming habit hybridizes freely with *C. madagascariensis* which has the highest latex flow per unit of cross-sectional area and the greater production of floral shoots. It is proposed to take advantage of these variations to establish clones of high yield. The establishment of clones can be done much more rapidly than in the case of the slower growing commercial rubber plants. Every form of budding and grafting succeeds almost 100%. Firm union is established in 3 days and the scion may grow as much as an inch and a half in 6 days. The flow of latex over the wound is thought to promote healing. Cuttings are difficult to strike. The plant produces genetically pure lines very readily. The latex is coagulated in water for 45 minutes and after manipulation for a moment to remove water and air is passed through a series of 5 standard rollers which are kept wet with water sprays. The samples compare well with first class *Hevea*.

350. "CAPITAL." 633.913

Quick-growing rubber.

*Plant. Chron.*, 1943, 38: 371.

Investigations by the Supply Department led to the discovery in India of a creeper, *Cryptostegia grandiflora*, which will yield a fair average quality of rubber, in quantities per acre approximately equal to those of ordinary rubber trees, within a year of planting. So far, 7,000 acres have been planted with the creeper in Muttra, while 5-acre experimental plots have been planted in some 30 different parts of the country. It is not thought that *Cryptostegia* will supplant the ordinary rubber tree after the war.

351. KHAN, K. M. A., AND KHAN, R. Z. 634.1/7

Better returns for fruit-growers.

*Ind. Fmg.*, 1942, 3: 137-40, 188-92.

Advice is given to fruit-growers in the Peshawar valley as to how to improve their orchard returns. The recommendations made are the result of recent research work at the Tarnab Research Station.

\* *J. sci. industr. Res. Suppl.* July, 1943.



352. BARNES, H. 634.413  
Custard apple.  
*Qd agric. J.*, 1943, 57: 147-9.  
Brief instructions for propagation, planting and pruning of the custard apple or cherimoya, generally catalogued as Mammoth or Pink's Prolific. Other varieties grown in Queensland are Island Beauty and Bullock's Heart.
353. ARMAND, L. M. 634.413  
Cultivo del- chirimoyo, (Cultivation of the cherimoya (*Annona cherimola*)).  
*Alm. Minist. Agric., B. Aires*, 1939, 14: 377-9.  
The usual cultural instructions are given. The author has experimented with *Rollinia emarginata* as a rootstock with much success. It is a common shrub in the Argentine province of Formosa and is more drought-resistant than the tree stock commonly used. It is raised from seed which must be sown immediately after extraction since the germinative power is fleeting. It can be grafted at 1 year old, immediately after transplanting from seed to nursery beds.
354. HORN, C. L. 634.441: 581.141  
The frequency of polyembryony in twenty varieties of mango.  
*Proc. Amer. Soc. hort. Sci. for 1943*, 1943, 42: 318-20, bibl. 2.  
Studies were made of 7,880 mango seedlings of 20 varieties at the Experiment Station, Puerto Rico. The highest percentage of polyembryony, viz. 51.141%, was shown by Giraffe. The only varieties not showing some degree of polyembryony were Brindabani, Divine and Pahari. Care was taken to distinguish between polyembryony and underground branching. The results are tabulated.
355. ADAMES, G. E. 634.57  
Babassú—a hard nut to crack.  
*Agric. Amer.*, 1943, 3: 193-6.  
Millions of babassú palms (*Orbignya speciosa*) grow in Brazil, particularly in the north-east, and their nuts are estimated to have a potential value 5 times greater than that of the coffee crop. Owing to a great demand for babassú nuts in the United States as a substitute for coconuts Brazil has now started to exploit her wealth. The oil is being used for a great variety of industrial and food purposes. So far, the crop has been neglected, because the nuts are extremely hard to crack. It is hoped that a machine will be designed which will do the cracking. Babassú palms are so abundant that there is no need to cultivate them. It is anticipated that after the war demand in the United States will decrease, but that the crop will have a great future on the Brazilian market.
356. GUEST, P. 634.57-2.191: 581.192  
A comparison of certain chemical constituents of green and chlorotic *Macademia* leaves.  
*Proc. Amer. Soc. hort. Sci. for 1943*, 1943, 42: 104-8, bibl. 12.  
Fresh green leaves of *Macademia ternifolia* var. *integrifolia* grown in Hawaii were higher in manganese and non-reducing sugar and slightly higher in dry matter, calcium, iron, reducing sugar and acid-hydrolyzable materials than chlorotic leaves. The latter were considerably higher in ammonia, amide and amino nitrogen and slightly higher in ash, magnesium, potassium and phosphates than green leaves. Tests for nitrogen were negative in both cases.
357. DODDS, K. S. 634.771  
Genetical and cytological studies of *Musa*. V. Certain edible diploids.  
*J. Genet.*, 1943, 45: 113-38, bibl. 21.  
A suggestion made in this genetical and cytological investigation on certain *Musa* diploids, carried out at the Imperial College of Tropical Agriculture, Trinidad, is that high auxin concentrations in the developing ovary may be regarded as the cause both of parthenocarpy and sterility in the female flower.
358. BARNES, H. 634.771-1.56  
A wireway for bananas.  
*Qd agric. J.*, 1943, 57: 207-11.  
A description of the construction of an endless wire system on the flying-fox principle for conveying banana bunches from the plantation to the packing shed, applicable also to any hillside orchard.
359. MEREDITH, C. H. 634.771-2.48  
Mercury compounds applied to banana plants in the field.  
*Phytopathology*, 1943, 33: 835-6, bibl. 3.  
The effect of some mercury compounds on the banana plant and on *Fusarium oxysporum cubense*, the Panama disease fungus, was studied at Glenleigh Laboratory, Highgate, Jamaica. Mixing the soil with 2, 4 or 8 oz. Hortosan per sq. ft. did not cause injury to the roots. Fungus growth was inhibited for 7 months at all three concentrations and was reduced for another 2 months in the 4 and 8 oz. lots. The chemical was more effective in acid soils than in neutral. 2 oz. of Hortosan per sq. ft. increased the growth of banana plants. Other mercury compounds, found not injurious to bananas at the time of planting, were DuBay 1155-HH, mercurous chloride and mercuric chloride.
360. CARTER, W. 634.774-2.654.1  
A promising new soil amendment and disinfectant.  
*Science*, 1943, 97: 383-4, reprinted in *Trop. Agriculture, Trin.*, 1943, 20: 187.  
At the Pineapple Research Station, Hawaii, a very real measure of control has been obtained over the root knot nematode, *Heterodera marioni*, by injecting the soil at 1 ft. intervals with a mixture of dichloropropylene and dichloropropane. The mixture was obtained in 50-50 form and in a crude form containing 75% mixture, 25% various impurities from the Shell Development Company of California. The impure form was successfully used with vegetables and is the cheaper. The pure form used on pineapple plots and injected through the mulch paper showed no results for over a year after treatment apart from the immediate effect in reducing populations of harmful organisms, but later it became clear that the treatment had also affected the soil complex in such a way as to permit the plants gradually to show increasing improvement over the untreated checks. This was in direct contrast to the results with chloropicrin, which, as usual, manifested themselves earlier with a dark green growth typical of pineapple plants grown in chloropicrin-treated soil. With pineapple as the test plant results are slow to accrue. The D-D mixture, as it is called, has great potential usefulness for other more rapidly maturing crops and experiments should be put in hand to determine the effect of treatment on specific organisms, the range of practical dosages for varying soils and weather conditions and the possibilities of treating soil around growing plants.
361. TAM, R. K., AND CLARK, H. E. 634.774-1.84: 632.944  
Effect of chloropicrin and other soil disinfectants on the nitrogen nutrition of the pineapple plant.  
*Soil Sci.*, 1943, 56: 245-61, bibl. 50.  
The influence of certain soil disinfectants upon the nitrification process and its subsequent effect on the nutrition of the pineapple plant were studied at the Pineapple Research Institute of Hawaii. It was found that a combination of steam, chloropicrin and formaldehyde or steam alone reduced nitrification and increased the N content of the plant in fertilized plots, the nitrogen absorption being correlated with the amount of ammonium available in the soil. Ammonium nutrition following disinfection treatment was associated with greater succulence, greater chlorophyll concentration and higher dry matter content in the leaves than that in plants grown in untreated soil. Stems, however,

were largest in plants with lowest N content. After steam or formaldehyde treatment the root system, though not correlated with N content or N availability, was greater than that of the checks.

362. PURSEGLOVE, J. W. 635.1/7(676.1)

Some Uganda vegetables.

*E. Afr. agric. J.*, 1943, 9: 25-8, 98-101, bibl. 10.

The commoner pot-herbs and plants with edible roots and seeds used as vegetables by Uganda natives are listed in alphabetical order. Brief notes on the botanical characters of the less known plants are given.

363. FRAZIER, W. A. 635.1/7: 551.566.1

Home gardening in Hawaii.

*Bull. Hawaii agric. Exp. Stat.* 91, 1943, pp. 115, bibl. 31.

A comprehensive modern textbook for home gardeners in Hawaii.

364. WHITE, C. T. 635.659

The sword bean or scimitar bean and the jack bean.

*Qd agric. J.*, 1943, 57: 25-7.

The sword bean or scimitar bean (*Canavalia gladiata*) and the jack bean (*C. ensiformis*) have been cultivated in Queensland for some time. The young pods are fit for human consumption, those of the latter are even said to be of very good flavour. The palatability of young pods of the wild jack bean (*C. obtusifolia*) has not been tested in Queensland but natives elsewhere are reported to use them as food.

365. TOBLER, F., AND ULBRICHT, H.

633/635: 551.566.1

*Koloniale Nutzpflanzen. (Economic plants of the colonies.)*

S. Hirzel, Leipzig, 1942, pp. 240, RM. 6.80, from review *Forschungsdienst*, 1943, Vol. 15, abstr. p. 16.

RIPPERTON, J. C., AND HOSAKA, E. Y.

581.9(969)

Vegetation zones of Hawaii.

*Bull. Hawaii. agric. Exp. Stat.* 89, 1942, pp. 60, bibl. 32.

AYRES, A. S.

631.4: 551.566.1(969)

Soils of high-rainfall areas in the Hawaiian Islands.

*Tech. Bull. Hawaii agric. Exp. Stat.* 1, 1943, pp. 41, bibl. 64.

MUTINELLI, A.

633.77

Miscelanea sobre el cultivo de la yerba mate. (Notes on the cultivation of yerba maté.)

*Alm. Minist. Agric., B. Aires*, 1939, 14: 193-200.

KOCH, D. E. V.

551.577: 631.84

The nitrogen content of Ceylon rain. Part II. *Trop. Agriculturist*, 1943, 99: 18-9.

KAR, P. C., AND SAHA, J. C.

633.523

A new stem-base disease of *Alstissima* [*Hibiscus sabdariffa* var. *altissima*] caused by a species of *Phytophthora*.

*Curr. Sci.*, 1943, 12: 229-30, bibl. 1.

## STORAGE

366. JENNY, J. 664.85.037

Schweleinrichtung für Gefrieranlage. (An expansion chamber for freezing plant.)

*Schweiz. Z. Obst- u. Weinb.*, 1943, 52: 611-2.

An expansion chamber designed for the freezing plant at Wädenswil is described. It consists of two receptacles suitable for dealing with samples up to 1 kg. and 10 kg. respectively.

367. SMOCK, R. M. 664.85.11

The stimulatory effect of one lot of apples on another in storage.

*Proc. Amer. Soc. hort. Sci. for 1943*, 1943, 42: 122.

An abstract of a Cornell University bulletin. No further identification is given. The magnitude of the stimulatory effect depends upon (1) *Maturity of the apples stimulated*. After the climacteric rise is well started there is no stimulatory effect. (2) *Maturity of the stimulator apples*. Post-are more potent than pre-climacteric apples. (3) *Storage temperature*. High temperatures induce the most striking effects. (4) *Number of apples supplying the emanations*. 1% of the total number of apples is enough to produce a significant effect on ripening. The effect is not increased and may even be decreased by large numbers of apples. (5) *Composition of atmosphere*. No stimulatory effects were observed in controlled atmosphere storage. (6) *The variety of the stimulator*. Some varieties seem to have a more marked stimulatory effect than others. (7) *Air conditions in the storage atmosphere*. Of a number of absorbents tried, bromine gas adsorbed on the surfaces of activated charcoal alone was successful.

368. BAGHDADI, H. A., AND SMOCK, R. M.

664.85.11.038

The comparative value of certain plastic materials and waxes in checking moisture loss from apples.

*Proc. Amer. Soc. hort. Sci. for 1943*, 1943, 42: 238-46, bibl. 12.

Of the various materials tested pliofilm, especially the heavier gauges, was the most effective in reducing moisture

loss, though contrary to previous supposition its use caused higher accumulation of carbon dioxide within the fruit than any other covering and occasional off-flavours were encountered, possibly due to relative impermeability to oxygen.

369. PLAGGE, H. H., AND LOWE, B.

664.85.037+664.84.037

Preservation of fruits and vegetables by freezing in refrigerated locker plants.

*Bull. Ia agric. Exp. Stat.* P46, 1942, pp. 486-528.

The bulletin provides detailed information on the selection, preparation and utilization of fruits and vegetables under frozen food locker systems. The recommendations are based on investigations conducted on a small scale in a kitchen laboratory at the Iowa Agricultural Experiment Station.

370. THORNTON, N. C.

664.85.771.035.1

Carbon dioxide storage. XIV. The influence of carbon dioxide, oxygen and ethylene on the vitamin C content of ripening bananas.

*Contr. Boyce Thompson Inst.*, 1943, 13: 201-20, bibl. 19.

Bananas of the variety Gros Michel were found to contain 14 mg. of ascorbic acid per 100 g. at the early green peel stage. After a slight increase the ascorbic acid content decreased to not less than 10 mg. at a desirable stage of ripeness. As the fruit became unfit for consumption through further ripening more vitamin C was lost. It is suggested that a balance exists between synthesis of vitamin C and its destruction within the fruit and that the ascorbic acid content may be correlated with the rate of respiration. The ascorbic acid content was reduced by exposure to a CO<sub>2</sub> atmosphere in the green stage, but gradually recovered to about normal at the brown peel stage in the same atmosphere. Removal from CO<sub>2</sub> storage resulted in a rapid increase of the ascorbic acid content to the level of untreated fruits at a corresponding stage. Oxygen concentrations of 1-100%, ethylene in concentrations of 1:8,000 to 1:500 parts of air and hydrogen cyanide in various concentrations tested had no detrimental effect on the ascorbic acid content.



371. WILLSON, K. S., AND OTHERS. 664.8.035.1  
Liquid sulphur dioxide in the food industries.

*Fruit Prod. J.*, 1943, 23: 72-82.

The application and handling of liquid sulphur dioxide in the food industries are described under the following headings:—Brining, dehydration or drying, bleaching, fumigation, miscellaneous related uses, removal of sulphur dioxide from food products, sulphur dioxide shipping containers and storage facilities, care in heating, handling, supporting and connecting containers, handling and transferring sulphur dioxide, measuring sulphur dioxide, corrosion by sulphur dioxide, leak detection, hazards due to leaks, sulphur dioxide solutions, preparing sulphur dioxide gas mixtures, preparation of sulphur dioxide solutions and brines, analytical methods for determining sulphur dioxide.

372. CULPEPPER, C. W., AND CALDWELL, J. S.

664.85.75.035.1

Varietal adaptability of strawberries to preservation in sulphur dioxide-calcium solution.

*Fruit Prod. J.*, 1943, 23: 5-9, 25, 46-51.

When Europe, in particular Holland which formerly supplied large quantities, ceased to supply strawberries barreled in  $\text{SO}_2$ , English manufacturers turned to Canada and the U.S.A. as a source of supply. The U.S. Bureau of Plant Industry therefore undertook to test the suitability of twelve widely grown strawberry varieties for preservation in sulphur dioxide-calcium solution. The fruit grown in commercial plantings near Salisbury, Md. was harvested at two stages of ripeness, early ripe and medium ripe, and preserved in sealed 5-gallon glass containers in sulphur dioxide solutions at concentrations of 1,500-3,000 parts with addition of varying amounts of calcium carbonate. The jams were made in the usual way employed with fresh fruit after the containers had been stored for  $8\frac{1}{2}$  months in darkness at 70° F. Samples, both of fresh and preserved fruit, were graded for maintenance of shape and wholeness of berry, flavour, and, in the case of the fresh fruit jam, for colour. The varieties Fairfax, Maytime and Redstar scored top marks in both groups. Berries preserved in sulphur dioxide solution with a suitable calcium concentration retained their shape better during boiling than fresh fruit, but artificial colouring had to be added to make them acceptable. Further, an addition of pectin toward the end of the boiling is advisable to raise the consistency of jam from preserved fruit to the standard of fresh fruit jam. The very considerable losses of volatile flavouring constituents were found to occur chiefly during the process of boiling and to a much lesser extent to be due to the sulphur dioxide treatment. Those varieties which develop high flavour early in the process of ripening should be selected as most suitable for preservation.

373. CRUESS, W. V., AND WHELTON, R. 664.85.63  
Comments on storage of olives.

*Fruit Prod. J.*, 1943, 23: 10-1.

As the result of their two seasons' experiments the authors recommend the packing of bulk, pickled ripe olives for retail sale in brine of 20-25° salometer containing 0.2% sodium benzoate (equivalent to 0.1% benzoate at equilibrium of brine and olives after storage for a week or more). Garlic, sweet peppers and fennel may be added in small amounts for flavouring. To prevent storage flavours arising frequent pH assays of the brines should be carried out and lactic or acetic acid should be added where the value is above 4.2.

380. (SHERMAN, V. W.)  
Food dehydration.

664.8.047

*Science*, 1943, Vol. 98, No. 2539, Suppl. pp. 10-1;  
and *Nature*, 1943, 152: 560-1.

The dehydration of vegetables by the use of radio-frequency energy to drive out the moisture makes possible for the first

374. MEIER, K.

664.85.5

Über die Behandlung der Baumnüsse zur Aufbewahrung. (Prestorage treatment of nuts.)  
*Schweiz. Z. Obst. u. Weinb.*, 1943, 52: 527-9.

The treatment of walnuts and hazelnuts before storage under Swiss conditions is described. Treatment consists of sorting, washing in luke warm water with the addition of 0.25% sodium carbonate, followed by rinsing in clear cold water, and the application of sulphurous acid by placing the damp nuts in a barrel up to three-quarters of its capacity and burning a sulphur wafer, containing 3.5 g. of sulphur, through the bunghole (1 slice for 80-100 litres). Further instructions relate to drying, in the process of which the temperature must not exceed 38-40° C. The dried nuts should be kept in a well-aired place safe from mice.

375. ANDRÉN, F.

664.84.21 + 664.84.13

Fortsatta försök med potatis-konserveringsmedel. (Preservatives for storing potatoes [and carrots].)  
*Växtskyddsnotiser*, 1943, Nr. 5, pp. 1-7.

A summary of 2 years' work on the effect of Konservos and other preservatives on the keeping of potatoes and carrots in storage. Whilst the results did not warrant treatment of potatoes, the difference in losses from rotting of treated and untreated carrots was 15% in favour of the former. Losses of treated carrots, however, still amounted to 42%.

376. ETCHells, J. L., AND JONES, I. D. 664.84.035.2

Preservation of vegetables by salting or brining.  
*Fmrs' Bull. U.S. Dep. Agric.* 1932; 1943, pp. 14, bibl. 10.

The detailed description of preserving vegetables in the home by salting or brining is supplemented by instructions for commercial application.

377. HARTMAN, J. D., AND GAYLORD, F. C. 664.84.492

The influence of different methods of handling on the keeping quality of stored Jersey sweet potatoes.  
*Proc. Amer. Soc. hort. Sci. for 1943*, 1943, 42: 519-23, bibl. 2.

Careful handling and packing compared to the commercial method increased duration of market life of sweet potatoes at Purdue University Experiment Station and greatly reduced scarring. Storage in rigid wooden crates was less satisfactory than in lined baskets and pads.

378. LARSSON, B.

664.84.35

Ett försök med förvaring av blomkål. (Storage of cauliflowers.)  
*Fruktodlaren*, 1942, Nr. 6, pp. 189-91.

The possibility of storing cauliflowers for a few weeks in autumn, in order to avoid a glut on the market, was tested by subjecting the heads to various treatments. The method of storing was the same in all cases:—the heads were put in trenches and covered with 20 cm. of loose soil. Wrapping the heads in paper after removal of the stalk was found to be the best pre-treatment. Plants thus prepared kept fresh for 4 weeks, but storing the heads unwrapped with stalk was not much inferior. In this case one has to see to it that the covering leaves protect the head from contact with the soil. Bad smell, if it occurs, can be remedied by application of dilute vinegar.

379. GERHARDT, F., ENGLISH, H., AND SMITH, E.

634.22: 664.85.22

The influence of maturity and storage temperature on the ripening behavior and dessert quality of the Italian prune.

*Proc. Amer. Soc. hort. Sci. for 1943*, 1943, 42: 247-52, bibl. 5.

## PROCESSING:

time the removal of 99% of moisture from a compressed vegetable block. Vegetables dehydrated by the electronic method will last for one or two years without deterioration even in hot humid climates. The process is to dehydrate to 80% by conventional dehydration, then to compress the vegetables into blocks and reduce the remaining moisture

to 1% by radio-frequency energy in a partial vacuum. Compression into tight blocks enables a large amount of food to be concentrated into a small magnetic field. Their final drying takes about an hour, for only a part of which time is short-wave energy actually turned on. The vitamin content of food so treated remains unusually high, and there is none of the tough blackened skin which develops when warm air dehydration is pushed too far. By electronic drying the inside and outside of the foods are maintained in an identical temperature, which is not the case with other methods. It is calculated that one pound of water may be removed electronically with less than one kilowatt hour of energy, costing about 1 cent in U.S.A. The method has been developed by the U.S.A. Federal Telephone and Radio Corporation in co-operation with the Office of the Quartermaster-General of the Army, and plans are being considered for construction of a 50 kilowatt electronic food drier handling 6 tons of dried foods a day, equivalent to about 60 tons of fresh food.

381. MOUBRAY, J. M. 664.8.047  
Dehydration.

*Rhod. agric. J.*, 1943, 40: 285-6.

A brief note on the possibilities of dehydration for Rhodesian products. Since vegetables can be dehydrated as cheaply overseas as in Rhodesia, it would be more economical to concentrate on tomatoes, Cape gooseberries, citrus, pawpaws, guavas, etc. The market for tomato powder is promising. The Government are assisting in the construction of a trial dehydration unit, chiefly from local materials, to deal with 6 tons of ripe tomatoes in 24 hours. The dry product would be processed and packed for export at a central depot. The present style of packing is in 40-lb. waterproof paper bags which are then wrapped in waterproof tobacco packing paper, baled in a baler as used for tobacco and sown up in export hessian.

382. JENNY, J. 664.8.047  
Moderner und zweckmässiger Dörrapparat mit Kondensation der Feuchtigkeit und Luftvorwärmung. (A modern dehydrator with moisture condensation and air pre-warming devices.)  
*Schweiz. J. Obst- u. Weinb.*, 1943, 52: 517-9.

A new model of a medium-sized dehydrator (8 m<sup>2</sup>) designed at Wädenswil Experiment Station is described.

383. DONOHUE, H. C., AND OTHERS. 664.85.047: 632.78

Preventing damage to commercial dried fruits by the raisin moth.

*Leaf. U.S. Dep. Agric.* 236, 1943, pp. 6.

The raisin moth, *Ephestia figulilella*, occurs in California and Arizona, being especially abundant in the fruit-growing areas of the San Joaquin and Sacramento Valleys. The protection of raisins, cut fruits and figs from damage by the insect during the process of drying is described.

384. ANON. 664.85.047 + 664.84.047  
Dehydrating fruits and vegetables at home.

*Circ. Ill. Coll. Agric. Ext. Serv.* 558, 1943, pp. 8.

Directions for dehydrating fruits and vegetables at home, indicating suitable varieties of pome and stone fruit.

385. ANON. 664.8.047  
A homemade food dehydrator.

*Circ. Ill. Coll. Agric. Ext. Serv.* 556, 1943, pp. 4.

Plans for the construction of a food dehydrator to be operated in the home.

386. JENNY, J. 664.85.047  
Ausnützung der Sonnenwärme zum Dörren. (Utilizing the heat of the sun for drying fruit.)  
*Schweiz. Z. Obst- u. Weinb.*, 1943, 52: 492-3.

A simple apparatus for sun-drying fruit has been designed at Wädenswil.

387. CRUESS, W. V. 664.84.047  
Investigations in vegetable dehydration.

*Proc. Amer. Soc. hort. Sci. for* 1943, 42: 487-92, bibl. 12.

A condensed account of general progress.

388. MARSHALL, R. E. 663.813: 634.11  
Prevention of precipitation in processed apple juice.

*Fruit Prod. J.*, 1943, 23: 40-2, bibl. 4.

Powdered apple pectin, added at the rate of one ounce per 150 gallons, prevented precipitation in apple juice in Michigan State College experiments.

389. HALL, E. G. 663.813: 634.3  
The home preservation of fruit juices. Preservation of citrus juices.

*Agric. Gaz. N.S.W.*, 1943, 54: 459-62.

Detailed instructions for preserving citrus juices in the home with special reference to retention of vitamin C.

390. ANON. 663.815  
Zur diesjährigen Obstresterverwertung. (Utilization of residues from fruit-juice-production.)  
*Schweiz. Z. Obst- u. Weinb.*, 1943, 52: 573-5.

Residues from apple-juice production in Switzerland are utilized for the manufacture of pectin, whereas mixed and pear residues serve as fodder when dried. Instructions are given as to how these residues should be preserved in the absence of drying facilities:—(1) by fermentation, (2) by application of benzoate (200 g. per 100 kg.), (3) by transformation into silage through the addition of 4 litres 5% Amosil per 100 kg. residue. The last named process appears promising, the second is losing in importance.

391. ANON. 634.11-1.56  
Lower grade apples reserved for processing.

*Fruit Prod. J.*, 1943, 23: 42, 61.

In order to prevent the fresh market from receiving a disproportionate amount of fruit the U.S. War Food Administration directed that the lower grade apples produced in specified areas could be sold only to authorized processors.

392. TEMPERTON, H. 634.11-1.56  
Feeding waste apples to poultry.

*Nature*, 1944, 153: 30-1, bibl. 3.

Minced ripe apples and their juice were mixed with balancer meal to form approximately one-half for the first fortnight and thereafter approximately three-quarters of the resultant mash and the mixture fed to pullets at the rate of 10 oz. per bird per day for the first fortnight and thereafter 13 oz., forming the solid food for 48 days. No ill-effects were observed and the birds showed an average increase in weight of 9.1 oz. No toxic effects are likely to follow the feeding of substantial quantities of ripe apples to fowls. Unripe apples, however, are probably harmful especially to young stock, possibly because of the relatively high content of non-protein nitrogenous compounds characteristic of immature fruit.

393. SAYED, I. A. 664.85.441.036.5  
Developing mango canning in Western India.

*Ind. Fmg.* 1942, 3: 129-32.

It is suggested that canning the best commercial mangoes such as the Alphonso and Pairi varieties may be developed into an important export industry of western India. The processes involved in the manufacture of canned mango slices and pulp on a semi-commercial and cottage industry scale are described in detail.

394. TANDON, G. L. 664.85.421.036.5  
Canning of guavas.

*Punjab Fruit J.*, 1943, 8: 1303.

Although canning of guavas has not been practised in India, trials show that the canned fruit develops a better taste and flavour than the fresh fruit. Directions are given for the selection, preparation and canning of guavas.



395. CHARAVANAPAVAN, C. 664.85  
The preparation of jam, preserves, candied fruit and cordials.  
*Trop. Agriculturist*, 1943, 99: 27-36.  
Methods of utilizing local fruits according to recent investigations are described.
396. ELLIS, W. J., AND LENNOX, F. G. 634.651-1.56  
Some observations on Australian-grown papain.  
*J. Coun. sci. industr. Res. Aust.*, 1943, 16: 166-72, bibl. 12.  
Samples of papain prepared by drying latex from green fruit of the papaw, *Carica papaya*, grown in Queensland, possess marked gelatinase and rennase activity. Juice pressed from the skins of the fruit possesses higher rennase activity than that obtained from the flesh. Seed extract has no measurable activity. The activity of the latex is of the same order for papain from different species of tree and for preparations dried with acetone, alcohol, or in the air. [Authors' summary.]
397. RIBEIRO, M. B. 634.8: 661.734.2  
Monografia sobre as possibilidades tecnica e economica da producao do enotannino em Portugal. (The possibility of producing grape tannin in Portugal.)  
*Publ. Minist. Econ. Lisboa, Ser. Estud. Inform. tec.* 18, 1942, pp. 30.  
It should be quite possible for Portugal to produce grape tannin on an economic scale if the proper measures for manufacture and preliminary research were undertaken. These are discussed. Factories could be established in connexion with the wine-making houses. For instance the Adega Cooperativa de Muge from its 1,300 pipes of white wine could produce 1,200 kg. of grape tannin from stalks, skins and seed or 700 kg. from the seeds alone.
398. HUMPHRIES, E. C. 633.74: 581.192  
Cacao tannin.  
*Nature*, 1943, 152: 569, bibl. 7.  
An explanation is offered why the Stiasny and Lowenthal methods of determining tannins have shown little agreement. New observations made at the Imperial College of Tropical Agriculture, Trinidad, appear to throw fresh light on the structure of the cacao tannin molecule.
399. SREERANGACHAR, H. B. 633.72-1.56  
The tea polyphenol oxidase—its material nature.  
*Curr. Sci.*, 1943, 12: 227-8, bibl. 5.  
In investigations of the tea polyphenol oxidase at the Tea Research Institute, Talawakelle, Ceylon, the enzyme was purified to a concentration of at least 800 times that present in fresh leaf. A proportionality between activity and copper content indicated that copper forms the active group of the enzyme. As a metallo-protein with Cu as its prosthetic group the tea oxidase takes its place along with the other polyphenol oxidases whose constitution and mechanism have been fully worked out.
400. ASKEW, H. O. 633.71-1.56  
The extraction of nicotine from New Zealand tobacco.  
*N. Z. J. Sci. Tech.*, 1942, 24: 41B-6B.  
A process for the recovery of nicotine from waste tobacco is given in outline. It should be efficient on a commercial scale.
401. JOACHIM, A. W. R., AND PANDITSEKERE, D. G. 634.1/8: 581.192  
The analysis of Ceylon foodstuffs. XI. (1) The composition of some minor fruits, home pounded grains, and vegetables. (2) The change in the vitamin C content of lime juice preserved with spirits.  
*Trop. Agriculturist*, 1943, 99: 13-7, bibl. 7.  
(1) The chemical composition of the following Ceylon fruits and vegetables are included in the data presented:—Durian (*Durio zibethinus*), rambutan (*Nephelium lappaceum*), velvet tamarind (*Dialium ovoideum*), gal siyambala, karawala kebella (*Antidesma bunius*), hog plum (*Spondias mangifera*), embarella, uguressa (*Flacourtia ramontchi*), kamaranga (*Averrhoa carambola*), wild olive (*Elaeocarpus serratus*), veralu, lovi lovi (*Flacourtia inermis*), red jambu (*Eugenia jambos*), loquat (*Eryobotrya japonica*), plantain flower (*Musa paradisiaca*), jak (tender) (*Artocarpus integrifolia*), and breadfruit (*Artocarpus incisa*). The vegetables are relatively rich sources of phosphorus and calcium, their protein content is approximately 11-12% of the dry weight. The carbohydrate content of breadfruit is about 80%. Some local grains are also analysed.  
(2) During 3 months' storage the vitamin C content of lime juice preserved with rectified spirits of wine and rum in the proportion 10:1 decreased from 41 to 3.4 mg. per 100 ml. Further investigations have been started to determine the effect of various factors on vitamin C losses from fruit juices.
402. LEONARD, R. H., MEADE, R. C., AND DUSTMAN, R. B. 634.11: 581.192  
Determination of sugars in apple tissues.  
*Industr. Engng Chem.* (analytical edition), 1943, 15: 579-82, bibl. 13, being *Sci. Pap. W. Va agric. Exp. Stat.* 284.  
In the analysis of apple tissues for sugars it is advantageous to heat the tissues in closed aluminum containers before grinding, to disintegrate, mix, and extract the heated tissue in a Waring Blender, and to determine cuprous oxide by dissolving it in ferric sulfate solution and titrating with potassium dichromate in the presence of diphenylamine indicator. The procedure is rapid and easily manipulated and the results are sufficiently accurate for the determination of sugars in many plant materials. In most instances it appears safe to omit clarification of the alcoholic extracts of apple tissue, with a corresponding saving in time. Where clarification is necessary this can be accomplished satisfactorily by addition of neutral lead acetate and centrifugation as described. [Authors' summary.]
403. ANON. 633.63  
Use of sugarbeet leaves and crowns in human nutrition.  
*Int. Rev. Agric. Rome (Mon. Bull. agric. Sci. Pract.)*, 1942, 33: 424T-5T.  
Reference is made to publications by several German authors (*Zuckerrübenbau*. 1942, pp. 105-9; *Mitt. Landw.*, 1942, 1 Sept., pp. 543-5; *Zbl. Zuckerindustr.*, Part 9, March 1942), who assert that leaves of the sugar beet are at least as good as young spinach. The stems were preserved in jars like asparagus. Analyses showed that the oxalic acid content of beet leaves and stems did not exceed that of rhubarb stems and Swiss chard (*Beta cicla*) stems and leaves.
404. BECKER, J. 634.23: 581.192  
Adatok fontonsabb meggyfajtáink kémiai összetételéhez. (The chemical composition of Hungarian acid cherries.)  
*Mitt. Kgl. Gartenb.-Akad., Budapest*, 1941, 7: 3-8, from abstract *Forschungsdienst*, 1943, Vol. 15, abstr. p. 18.  
Hungarian acid cherries contain little carotene or vitamin B, but 8-10 mg. vitamin C per 100 kg. fresh fruit. The acid content varies according to local conditions, even within the same variety.
405. BECKER, J. 634.21: 581.192  
Adatok fontosabb barack-jaiuk kémiai összetételéhez. (The chemical composition of Hungarian apricots.)  
*Mitt. Kgl. Gartenb.-Akad., Budapest*, 1941, 7: 9-13, from abstract *Forschungsdienst*, 1943, Vol. 15, abstr. p. 18.  
The apricot is the most valuable fruit exported from Hungary. The early variety "Kajszi" contains more sugar

and acid than the later "Rózsa". 100 kg. fresh fruit contain 2-3 mg. carotene, a little vitamin B and 6-8 (in some cases up to 15) mg. vitamin C.

406. KEYS, O. H. 634.11: 581.192: 577.16  
Vitamin C in apples and other materials.  
*N. Z. J. Sci. Tech.*, 1942, 24: 146B-8B, bibl. 5.  
In New Zealand the Sturmer apple contains more vitamin C than any other variety commercially grown. After peeling the flesh may be expected to contain 15-20 mg. ascorbic acid per 100 g. There is no appreciable loss on cool storage. The leaves of the garden polyanthus, primrose and auricula contain up to 900 mg. ascorbic acid per 100 g. of fresh weight. Chinese gooseberries (*Actinidia chinensis*) contain 100 mg. ascorbic acid per 100 g. flesh. The methods used at the Dominion Laboratory for determining ascorbic acid are outlined. In using the chemical method, sodium hexameta-phosphate (Calgon) can be used with N sulphuric acid in place of metaphosphoric acid. The dye solution is more stable at pH 8 or 9 than at pH 7.
407. MELVILLE, R., WOKES, F., AND ORGAN, J. G. 634.51: 577.16  
Apparent vitamin C in walnuts.  
*Nature*, 1943, 152: 447-8, bibl. 9.  
Apparent vitamin C, which will react with the dye and is estimated as ascorbic acid under the usual titration conditions but is not true vitamin C, has now been found in walnuts. 31% of the mean total vitamin C content of *Juglans regia*, 2,070 mg. per 100 g., were determined to be apparent vitamin C. In other *Juglans* species the vitamin C content, the distribution of which over different tissues is indicated, is somewhat less. The fully-developed kernel contains very little vitamin C.
408. LUGG, J. W. H., AND WELLER, R. A. 634.51: 577.16  
Vitamin C in walnuts.  
*Nature*, 1943, 152: 448, bibl. 3.  
The vitamin C content of the *Juglans regia* varieties, Wilson's Wonder and an unnamed variety was determined as 3.86 and 8.75 mg./g. of tissue respectively, the "total" vitamin C content (ascorbic acid + dehydroascorbic acid calculated as ascorbic acid) being 4.04 and 9.30 mg./g. respectively. The determinations were carried out at the Nutrition Laboratory, Adelaide University.
409. HANSEN, E. 634.51: 577.16  
Ascorbic acid content of walnut hulls.  
*Proc. Amer. Soc. hort. Sci. for 1943*, 1943, 42: 265-6, bibl. 3.  
On a fresh weight basis the ascorbic acid content of walnut hulls, mature at time of picking, compares favourably with that reported for English rose hips. On a dry weight basis the hulls are a much richer source. The nuts used in these tests were from horticultural varieties of so-called English walnut trees (*Juglans regia*), the American Eastern Black walnut (*J. nigra*) and the northern California black walnut (*J. californica* var. *hindsii*) growing at the Oregon Experiment Station.
410. PEKOWITZ, L. P. 635.1/7: 577.16  
The stability of carotene in acetone and petroleum ether extracts of green vegetables. I. The photochemical destruction of carotene in the presence of chlorophyll. II. The stabilizing effect of sodium cyanide.  
*J. biol. Chem.*, 1943, 149: 465-71, bibl. 11.  
(1) Studying the stability of carotene in acetone and petroleum ether extracts of green vegetables at the Rhode Island Agricultural Experiment Station the author observed a loss of 60% of the carotene in extracts of cooked materials and of 40% in extracts of raw materials during a 6-hour exposure to daylight. In subsequent experiments it was shown that the rate of destruction depends on the duration of the exposure to light and on the quantity of chlorophyll present. The latter observation indicates that chlorophyll is directly involved in the reaction and does not act merely as a catalyst. It is, therefore, essential for carotene estimations that the extracts should be kept in the dark or the chlorophyll immediately removed. (2) Sodium cyanide was found to have a partial inhibitory effect upon the photochemical destruction of carotene, probably in its capacity as a catalytic poison to enzymes. The chemical also prevents the non-photochemical enzymatic destruction of carotene occurring in raw vegetable extracts.
411. ALEXANDER, O. R., SALLEE, E. D., AND TAYLOR, L. V. 664.84.656.036.5  
Variation in chemical composition of raw and canned peas.  
*Food Res.*, 1943, 8: 254-64, bibl. 8.  
Experimental data show that there is a slight decrease in the concentration of protein, carbohydrate, calcium and magnesium during canning by normal and by the new Blair process.
412. PHETEPLACE, W. D., Jr. 664.8  
What does the deaeration of foods accomplish?  
Reprinted from *The Glass Lining*, 1943; *Fruit Prod. J.*, 1943, 23: 43-5.  
FINK, H., AND KLEBER, W. 634.771-1.56  
*Zur Frage der Bananenverwertung.* (Utilization of bananas.)  
De Gruyter & Co., Berlin, 1939, pp. 229, RM. 4, from *Forschungsdienst*, 1943, Vol. 15, abstr. p. 15.  
GUYMON, J. F., TOLBERT, N. E., AND AMERINE, M. A. 663.2  
Studies with brandy. I. pH.  
*Food Res.*, 1943, 8: 224-30, bibl. 7.  
TOLBERT, N. E., AMERINE, M. A., AND GUYMON, J. F.  
Studies with brandy. II. Tannin.  
*Food Res.*, 1943, 8: 231-6, bibl. 14.  
MEIKLEJOHN, J. 633.491: 577.16  
The vitamin B<sub>6</sub> content of potatoes.  
*Biochem. J.*, 1943, 37: 349-54, bibl. 10.  
BALLS, A. K., AXELROD, B., AND KIES, M. W. 635.655: 581.192  
Soy bean lipoxidase.  
*J. biol. Chem.*, 1943, 149: 491-504, bibl. 25.  
HUNTER, R. F., SCOTT, A. D., AND EDISBURY, J. R. 634.6: 581.192  
Palm oil carotenoids. 2. The isolation of lipid pigments from a West African plantation oil and some remarks on the isomerization of carotinoids.  
*Biochem. J.*, 1942, 36: 697-702, bibl. 26.  
NATH, B. V. 633.913-1.56  
A note on the coagulation studies of the latex of *Cryptostegia grandiflora* R.Br. as a war-time source of vegetable rubber.  
*Curr. Sci.*, 1943, 12: 255, bibl. 1.  
PAUL, E. B., BLAKERS, A. L., AND WATSON, R. W. 633.913: 581.192  
The rubber hydrocarbon of *Asclepias syriaca* L.  
*Canad. J. Res.*, 1943, 21, Sec. B, pp. 219-23, bibl. 5.  
TURRALL, W. T., KLASSEN, J., AND SMEDLEY, H. 633.913-1.56  
Froth flotation of rubber and resin components of milkweed and other plants that contain resins, rubber, balata or related gummy substances.  
*Canad. J. Res.*, 1943, 21, Sec. B, pp. 195-201, bibl. 1, being N.R.C. 1161.



## NOTES ON BOOKS AND REPORTS

413. DODGE, B. O., AND RICKETT, H. W. 635.9: 632.1/9  
*Diseases and pests of ornamental plants.*

The Jacques Cattell Press, Lancaster, Pennsylvania, 1943, pp. 638, 200 figs., \$6.50.

As a result of "grow more food" campaigns ornamental plants at the present time are receiving comparatively little attention. When they come into full favour again more attention will have to be given to their pests and diseases, which not only affect those host plants, sometimes resulting in heavy losses to nurserymen, but also often occur on food plants so that the chances of pests and diseases being transmitted from ornamental to food plants and *vice versa* must be borne in mind. Two members of the staff of the New York Botanical Garden have collaborated in bringing together in one volume much information that was scattered in various, sometimes not very accessible, publications. The book "is addressed to gardeners rather than scientists" and this introduces difficulties in presentation. Thus the descriptions in Part 1 (pp. 1-117) of bacteria, fungi, and insects are too detailed, with too many scientific terms for the gardener whose chief concern is the recognition (without microscopic examination) and control of diseases and abnormalities rather than the study of the parasites and pests. In Part 2 (pp. 118-613) which deals with the "diseases and pests of particular hosts", the host plants are arranged alphabetically by their scientific names. This arrangement is unavoidable since some of the hosts are known only by their generic names. Their common names appear in the index, however, so that when a common name only is known to the reader it may easily be found in the body of the book. Diseases caused by flowering plants, fungi, bacteria and viruses, physiological disorders and damage caused by insects, mites, eelworms, slugs and snails, are described; many of them are illustrated from photographs, and measures for their control are outlined. The ground would, on the whole, appear to be well covered, and serious misprints to be few. Bordeaux mixture is frequently mentioned for the control of fungal diseases; as it is so very disfiguring to foliage some form of "colloidal" copper would be preferable for ornamentals.

H.W.

A very comprehensive list is given of the species of insects and closely allied animals associated with ornamental plants. Mention is made of some species which occur in Europe in addition to those of the U.S.A. The entomological aspect of the book would appeal to the research and advisory entomologist rather than the gardener or the layman, since a considerable knowledge of the subject is necessary before full use can be made of a book of this nature. For example in chapter III the distinguishing characters of the different orders of insects are set out very briefly (pp. 50-58), and the illustrations are too few to enable the working gardener to identify his captures correctly. In the main the control measures are adequate, but it is surprising to note that the recognized treatment for big bud on flowering currants, namely a 3% lime-sulphur spray in the grape bud stage, is not mentioned on page 526. On page 164 the cyclamen mite and the strawberry mite are regarded as two distinct species, whereas they are one and the same, while on page 594 two species of woolly aphides are referred to on elm. *E. lanigerum* does not occur on that host.

After the war when plants are once more transported from country to country the risk of introducing diseases into a fresh locality will arise. The present book will aid in the diagnosis of diseases and pests of ornamental plants, trees and shrubs, enabling the gardener to identify and control them, and the scientist to recognize new introductions so that the necessary steps may be taken in time to prevent their spreading.

A.M.M.

414. WHITE, P. R. 578.085  
*A handbook of plant tissue culture.*

The Jacques Cattell Press, Lancaster, Pennsylvania, 1943, pp. 277, figs. 71, bibl. 457, \$ 3.75.

Plant tissue culture is in its infancy and its use as a method of

studying plant behaviour and morphogenesis has hardly yet begun to be exploited. Results already obtained, however, open interesting lines of investigation, and the future will show whether the elaborate care necessary in manipulation, and the expense of erecting, equipping and maintaining laboratories such as the one shown on page 68 of Dr. P. H. White's book, are justified. The author writes (p. vi of the Preface), "Plant tissue culture has, in the last decade, developed to a point where it deserves and even demands consideration as a separate, valid, useful, and promising, if not yet fully mature, discipline", and for that reason he has written this book which gives the history of the subject, goes very carefully into methods used in such cultures and indicates some lines along which one may hope for further application of the methods. He himself is an investigator in this field and some of his own, hitherto unpublished, work is mentioned. The presentation is clear and the text very readable in spite of the many references to the literature. The bibliography consists of 457 references bearing directly or indirectly on animal and plant tissue culture. An unusual feature is that each chapter ends with a summary. After a short historical review the book deals with the living material, the laboratory [the elaborate layout is "presented as an example, not an ideal", and one wonders what the ideal would be], nutrients, how cultures are started, culture technique, and growth measurements. Next there is the application of the methods to certain physiological processes such as tropisms and cellular reaction, and to plant pathology, histology and cytology. Under plant pathology reference is made to tissue culture in the study of crown gall and certain virus diseases.

It is stated that the method as it stands to-day is hardly usable for the maintenance of plant tissues as substrata for pathogens "for the obvious reason that the basic nutrient for tissues is also an excellent nutrient for many of these organisms". We venture to point out, however, that root-attacking organisms occupy the same substratum as the host and the method might well be tried in the study of such organisms. Tissue culture at present appears to have but little application to horticultural problems. One possible line is in the study of incompatibility between rootstocks and scions, for it is shown (Fig. 64) that graft unions can be formed in culture. Again, much of the tissue culture work already carried out has been on roots, and this suggests that the method might be used for a comparative study, *in vitro*, of the roots of fruit-tree rootstocks. It might be possible, for instance, to distinguish in such root cultures "dwarfing" and "vigorous" rootstocks; if so, it would supplement the anatomical method of examining rootstocks as a preliminary to the time- and labour-absorbing field trials. The results already obtained should serve to inspire others with further ideas. Those who have already taken up plant tissue culture work and those who contemplate attempting it will find this book a most useful guide. There appear to be very few misprints. In the last column of the table on p. 164, -4 and -1 should read +4 and +1, and under Fig. 51 the reference should be to Fig. 60 not Fig. 56.

H.W.

415. PHILLIPS, A. H. 663.61: 581.084.1  
*The science of soilless culture.*

C. Arthur Pearson, London, 1943, pp. 118, 5s.

This book is described as an advanced sequel to the author's previous work "Gardening without soil". It is intended for those who, already grounded in the simple and basic principles of soilless culture, now wish to turn experience gained in previous dabblings to commercial advantage. The author, very naturally, is at pains to emphasize the advantages which he considers are to be obtained by soilless culture under glass compared with the use of soil but he is careful to point out the limitations and difficulties and refrains from indulging in the exuberant optimism which has afflicted so many writers on this subject. A thorough grasp of the principles involved is necessary if success is to be



achieved and no pains are spared in this book to make their understanding easy.

Soilless culture in England is still in its infancy, consequently many of the data, as is freely acknowledged, have been drawn from America where commercial establishments are already prospering.

True hydroponics, or the growing of plants in a purely liquid medium, is now outmoded in favour of aggregate culture in some uniform, comparatively solid medium in which the roots can get a hold. The choice of an aggregate is important and the respective merits and demerits of cinders, gravel and sand are examined. Cinders, which must be well washed or weathered, have the advantage of cheapness, lightness of weight on the benches and are easily come by and the cinder school is steadily gaining converts. In the use of dry nutrients, however (dealt with in an appendix), sand is essential.

A chapter is devoted to providing a broad outline of the main essentials of plant physiology and the part played or thought to be played—there are many lacunae in present-day knowledge—by the various nutrient elements, of which fourteen are mentioned.

Other chapters deal with the construction and management of equipment (illustrated), the preparation of nutrient solutions and their testing, the influence of environment, especially of temperature and light and a tabulated description of deficiency symptoms taken from the Arnold Wagner deficiency chart of Ohio State University. An appendix contains some useful metric tables, conversion tables and tables of atomic and molecular weights together with eleven formulas suggested by leading Canadian and American experimenters.

The book can be recommended as a useful guide to this form of horticulture, covering all the necessary ground and being issued at a price which, for these days, must be considered cheap.

416. MACSELF, A. J. [Editor]. 634.1/7  
*The fruit garden.*

Eyre & Spottiswoode, London, 1943, pp. 158, 5s.

This little book, revised by Dr. G. B. Whitehead, attempts to cover the whole field of fruit-growing for the amateur. In a general way it succeeds well in this task and it contains valuable advice on what to plant, and how to tend the newly planted fruit and bring it into cropping. Chapters are devoted to the general subject of fruit-growing in gardens and the usual hardy fruits are dealt with individually. An unusual feature is a chapter on miscellaneous fruits that includes notes on the fig, medlar, quince, filbert, cob nut and walnut, pointing out their suitability for the garden. The viney is also dealt with, and the other chapters cover pruning, pests and diseases, propagation and the wartime regulations affecting fruit-growers. It is rather a pity that in a book of this nature, which will reach a very wide circle of gardeners, more care was not bestowed on absorbing the results of recent research. This is especially true in relation to rootstocks where the mention of East Malling would lead the reader to expect the very latest information, only to find the classification of stocks I and II out of date, Quince B wrongly grouped with Quince C as dwarfing, Common Mussel lauded to the detriment of Common Plum and Mahaleb recommended for cherries. Fortunately the amateur's choice of stocks is so restricted by wartime conditions that he must take what the nurseryman gives him and so he is unlikely to be able to go far astray, especially if he follows the advice of a really good nurseryman as advised in this book. Some of the advice on pests and diseases is out of date. The illustrations are on the whole helpful but more attention could have been paid to details. For instance the picture of budding (p. 147) shows the operation being carried out with the whole leaf attached to the bud throughout, whereas the leaf-blade ought to have been removed as soon as the bud-stick was cut. It is also regrettable that the amateur is not referred to his local

horticultural advisory officer for advice instead of only to nurserymen and the spray manufacturers. Many amateurs will doubtless find this book useful and possibly it will stimulate interest in fruit-growing to the extent of making them seek more reliable information from other sources. Read in conjunction with the excellent leaflets issued by the Ministry of Agriculture most of the anachronisms can be avoided. H.B.S.M.

417. ARGENTINA. 633/635

*Almanaque del Ministerio de Agricultura de la Nacion, 1943*, B. Aires, 1943, vol. 18, pp. 447.

The almanac contains a large number of short articles on the agriculture and horticulture of the country. They are written particularly for the benefit of practical men. Translated titles with notes of a few of the more interesting follow: "Ripening dates of the principal commercial fruits", p. 185, a broad classification. "The influence of winter on deciduous fruit trees", p. 345 (see abstr. 64). "Biological control of fruit tree pests", p. 363, special reference to results in Argentina. "Diseases of gladiolus and tulip", p. 65. "Tea plucking in Misiones" (the tea district of Argentina), p. 13. "Three aromatic medicinal plants of Argentina", p. 202: *Pluchea suaveolens* (Compositae), hepatic and biliary affections; *Lippia turbinata* (Verbenaceae) as a laxative and as a stimulant in nervous prostration; *L. triphylla* (Lemon Verbena) a stimulant in nervous affections, stomachic, diaphoretic. "Planting and care of the olive", p. 375. "Some types of commercial tobacco grown in Argentina", p. 381. "The selection, extraction and sowing of seed of the white mulberry" (for silkworms), p. 93. "Planting trees against wind erosion", p. 118; a list of suitable species is given.

418. BERMUDA. 633/635 + 664.8.037

*Report of the Department of Agriculture, Bermuda, for the year 1942, 1943*, pp. 12.

The chief problems with which the Department of Agriculture had to deal were shortage of labour, seed supply, the supply of seed potatoes from the usual sources, U.S.A. and Canada, and the planning and encouragement of production in view of the closure of export trade. The problem of conservation was partly solved by the opening of a cold storage plant for many years unavailingly urged by the Department of Agriculture. The plant was constructed on a plan much smaller than was originally envisaged by the Department and as a result of its immediate success it urgently needs extension. It will form a central vegetable mart and will conduct sales of stored produce on behalf of farmers.

419. INDIAN TEA ASSOCIATION. 633.72

*Annual Report Indian Tea Association, Scientific Department [Tocklat] for 1942, 1943*, pp. 6.

Work at Tocklat has been handicapped by the absence of most of the scientific staff on war service and by the requisition of many of the buildings. However, the long-term experiments were maintained and a list of these is given. The vegetative propagation of bushes already selected for their characteristics in finished teas has been nearly completed. An experiment has been started with 5 selected clones to ascertain how closely teas from the clone plots resemble the teas from the original bush and whether they bear the same relation to each other as do the teas from the original bushes. An experiment has been planned to compare bushes raised from cuttings with bushes of the same jati raised from seed. Individual bushes differ greatly in the readiness with which the cuttings form roots. Cuttings from bushes giving a low quality of finished tea rooted more easily than cuttings from good quality bushes, and cuttings of green wood root very much more readily than those from red wood. There was no difference in ease of rooting between cuttings from a mother stem and those from laterals. Pollen compatibility tests have given poor results in many cases of artificial self-pollination.



420. IOWA.

634/635

*Report of Iowa Agricultural Experiment Station on Agricultural Research for the year ending June 30, 1941, Part 1, 1942 (?)*, pp. 278.

Brief accounts are given of many different projects. *Pomology*. Prolonged trials show the outstanding value of Hibernal and Virginia crab when grafting apples for hardness. Root disease- and pest resistant-apple seedlings are reported. Among hardy dwarfing apple stocks Dudley is commended. The use of such a stock as intermediate either by budding or merely ring grafting gives maximum dwarfing effect. Different systems of soil management are under trial. Apple breeding for colour and other qualities continues. Plum breeding aims at the production of hardy plums with fruit of a higher sugar content. Peach breeding aims at hardness combined with high quality. The different rootstock effects of Hibernal and Virginia crab on quality and quantity of apple varieties are noted. Investigations are in progress on rose stocks. Frozen locker storage trials are continuing. Gas storage trials on Concord grapes and Jonathan apples are reported. *Vegetables*. Trials are reported on asparagus cultivation, sweet potato storage, manuring and breeding, on onion breeding, on overhead irrigation. *Farm crops*. Soybeans selections for use as vegetables are being tested. *Soils*. Greenhouse investigations are being made on nutrient deficiencies. *Botany and plant pathology*. Studies are in progress on onion diseases, especially yellow dwarf, apple blight (*Bacillus amylovorus* and others) and scab, and the diseases of small ornamentals and fruit tree stocks are being studied. *Entomology*. Work is in progress on onion pests, the codling moth and apple maggot (*Rhagoletis pomonella*).

421. NIGERIA.

634.6

*Fourth Annual Report of the Oil Palm Research Station, Nigeria, 1942-43*, pp. 36 (mimeographed).

Some results of experiments are recorded. *Establishment experiments*. With young palms not yet in bearing intercropping with yams led to more rapid growth and the intercropped palms stand out markedly from the rest. In the Belgian Congo (I.N.E.A.C. Rept. 1939) intercropping also produced higher yields in the first year of bearing. Weed cover cutlassed only when 10 ft. high retarded growth and caused the palms to draw up through over-shading. Under low controlled weed cover and leguminous cover the palms made equal growth, superior to uncontrolled weeding but inferior to that of the intercropped palms. *Burning v. non-burning*. Palms on the non-burnt plots produced 10% more leaves than those on the burnt plots. *Transplanting*. Seedlings should have their leaves pruned back to the central spear before transplanting, those so treated showing only half the amount of loss of untreated seedlings. Light or heavily pruned plants showed much better growth and transport costs are thus much reduced. In digging seedlings the long and fibrous brown roots must be carefully preserved, the young white roots are only of importance if the older ones have been damaged. Holing, minimum 2 ft. cube, reduced transplanting losses by 25% and gave much better developed plants at the end of the first year. Best treatment, viz. no root pruning, severe leaf pruning, holing, showed 5% loss. Worst treatment, viz. all roots cut off, no leaf pruning, no holing, gave 60% loss. The seedlings in these experiments were two days out of the ground, and had made a long journey crowded in a lorry in trying weather conditions. *New experiments*. Comprehensive details are given of the layout of new experiments, namely, spacing—grazing—intercropping, to determine the optimum spacing for oil palms as a sole crop, when the land is to be grazed and when the palms are to be under-cropped with food plants. *Experiments at Nkwela, Onitsha*. Yellowing disease. Trees suffering from yellowing disease showed complete recovery when treated with heavy dressings of incinerator ash amounting to 17 tons per acre spread over 3 years. This is probably nowhere near the limit of tolerance, since a palm

at the U.A.C. Ndiang estate treated with boiler ash at the rate of 55 tons per acre also made a complete recovery. The minimum amount known to cure is 90 lb. per tree, which is effective in 18 months. Minimum quantities to effect a certain cure are to be determined. The active constituent of the ash may be potash, for reasons which are tentatively suggested but require further investigation. *Intercropping at Nkwela*. Intercropping with cocoyam and manuring increased yields by 77%, without manuring, 20%. The manured plots produced the healthiest palms. *Leaf pruning at Aba*. Severe pruning, all leaves cut off except the central spear, led to a serious drop of 50% in yield within 18 months. Nearly 50% less bunches were produced and some palms ceased to fruit. This form of pruning is often done by farmers to obtain materials for thatching or to allow of intercropping. *Selection, breeding and botanical investigations*. An account is given of the progress to date. The seed now being distributed to farms is expected to be superior to that of wild palms by 25% as regards yield of bunches and by 20% as regards oil content of fruit.

422. PALESTINE.

634/635

*Annual Report of Palestine Department of Agriculture for year ended March 31, 1942, 1943*, pp. 13, 225 mls.

About 6,000 dunums\* of citrus were uprooted during the year and no permission was given for planting new citrus areas. The uprooted areas were used for vegetables. The general standard of citrus groves deteriorated through lack of pruning, manuring, especially nitrogen, and soil cultivation, scarcity of labour and increase of labour pay to 100% above pre-war level. Severe heading back of citrus on the ground that such trees need less water and render vegetable cultivation possible beneath them appeared to be a misguided practice. There was a further increase in the manufacture of citrus by-products and the following are now produced for export or local use:—concentrated juice, essential oils, preserved and pasteurized raw juice not exportable to U.K., marmalade, squashes, alcohol, citric acid, dried peels for fodder, canned grapefruit and pectin. There was an increase in the use of citrus fruit for fodder, both fresh and ensiled. The work of the Citrus Control Board and the Citrus Marketing Board is briefly summarized. The area under vegetables is increasing rapidly owing to extension of irrigation. Raising and distribution of seedlings was undertaken by the Government stations. Crops of deciduous fruits were below normal through unfavourable weather conditions but interest in further plantings continued. The olive crop was below average. Olive suckers were planted in the absence of sufficient budded olives. Propagation by seeds instead of suckers is being introduced very successfully; vegetative propagation by wiring and mounding has proved promising. The 8 horticultural stations were in full working order and have recovered from the extensive damage and neglect during the disturbances of 1936 to 1939. Investigation work included causes of acidity in olive oil, blossoming and foliation of deciduous fruit in connexion with the selection of suitable varieties for different districts, maturity standards of Palestine grapes, a study of local flowering and maturing of bananas, wastage in exported citrus.

423. PUERTO RICO.

63/65

*Annual Report of the Puerto Rico Agricultural Experiment Station, Rio Piedras, for the fiscal year 1941-42*, pp. 57.

Some results of horticultural interest are given below. *Avocado*. The use of young seedling rootstocks is desirable. Pretreatment of the budwood in paraffin emulsion increased the efficiency of budding. *Grapefruit*. On soil known as

\* 1 dunum=approx.  $\frac{1}{4}$  acre.



Coto Clay No. 20 the best fertilizer in the fifth year of the trial was 120 lb.  $\text{NH}_3$ , 175 lb.  $\text{P}_2\text{O}_5$  and 225 lb.  $\text{K}_2\text{O}$  per acre. *Melon*. Smith's Perfect was the only high quality variety which resisted downy mildew. *Papaya*. Bunchy top disease seriously interfered with the crop. Although presumably a virus, artificial transmission could not be obtained. All recently introduced varieties from Central America proved susceptible. *Pineapple*. Third-year studies show that manganese in the absence of iron causes chlorosis similar to that found in the field. In the absence of iron, chlorosis was increased by boron, copper and aluminium, but not by zinc. 1 p.p.m. of iron as iron humate prevented the severe chlorotic effects otherwise resulting from 5 p.p.m. of manganese. *Coffee*. Deficiency in N, K, P, Ca, Mg or S produced marked alterations of growth and necrosis of the tissues. Various kinds of chlorosis were produced by deficiency in the minor elements. Reduced shade in combination with increased N appeared to accelerate growth. On soils of pH 4.5 but not of pH 5.5 one ton of carbonate of lime per acre increased yields in a 4-year trial. Cuttings of semi-mature wood treated with naphthylacetamide, naphthaleneacetic acid or indolebutyric acid in 1-1,000 mixtures with talc rooted in 14-18 weeks. Concentrations of 1-500 were effective with mature wood. The most effective humidity was 75%. On Catalina Clay economic yields were produced by a fertilizer made up of  $\text{NH}_3$  112.5 lb.,  $\text{P}_2\text{O}_5$  37.5 lb. and  $\text{K}_2\text{O}$  112.5 lb. The commonly used shade trees *Inga laurina* and *Inga inga* proved the most suitable in every respect of a number of kinds listed. The coffee variety *Columnaris*, of comparatively recent introduction, has given outstanding yields over an eight-year period on Catalina Clay. Coffee root disease caused by *Fusarium* sp. was increased by high humidity, high temperature and high acidity. The leaf miner parasite *Mirax insularis*, which destroys 65-85% of the miner caterpillar in Guadeloupe, has become established, though at present incidence is low. *Cucumber*. A variety resistant to downy mildew (*Peronoplasmodium cubensis*) has been developed at the Station. First-year results of a fertilizer trial were in favour of a 10-10-5 formula. Peppers (*Capsicum*). Mosaic resistant peppers of good commercial qualities have been isolated. *Seed storage*. Oven-dried clay soil showed promise as a cheap dehydrating agent for stored bean seed, being one-half as efficient as calcium chloride, drying the bean sufficiently without appreciable formation of hard seed. Hard seed condition can be revised by storage for a short time at high humidity or for one month at atmospheric conditions. The rehydration of beans from 5.02% moisture to 14.03% moisture over distilled water reduced the percentage of hard seed from 74% to 10%.

424. TRINIDAD AND TOBAGO. 63: 551.566.1  
*Report of the Agricultural Policy Committee of  
 Trinidad and Tobago Part I*, Trinidad, 1943,  
 pp. 142, 50 cents.

The terms of reference of the Agricultural Policy Committee appointed in June 1942 included the definition of the objectives of a policy for agricultural development for Trinidad and Tobago, the formation of such a long-term policy, the laying down of the broad lines of research programmes and the suggestion of means whereby the results of experiments might be more efficiently communicated to producers. Closer co-operation between producers, their organizations and the Government in regard to research, extension services and marketing were to be considered and the relationship of the Government services concerned with agriculture reviewed and developed. Part II of the Report (not yet received) examines the structure and establishment of the Department of Agriculture in relation to the proposed policy and programme of future work and makes recommendations as regards staff, organization and other facilities.

425. ZANZIBAR PROTECTORATE. 633/635: 551.566.1  
*Annual Report on the Department of Agriculture,  
 Zanzibar, for the year ended 31 December 1942*,  
 1943, pp. 7, 1s.

An account is given of the methods of compulsory registration of all males between the ages of 18 and 45. Those who could not show that they were otherwise fully employed were allotted plots of about one acre and instructed to cultivate them, the planting material being provided free. There were 2,000 persons so provided in Zanzibar Town alone. The country districts also responded well and were encouraged in various ways and marked progress in local food crop production has resulted. The normal difficulty in providing planting material of sweet potatoes, due to the destruction of the vines when the crop is lifted at the end of the cool season, has been overcome by levelling and planting with potato vine cuttings the banks bordering the deep drains along the main roads at the time the potatoes are lifted. Over 50 miles of roadside have been thus treated and will ensure enough planting material for a general order for sweet potato planting during the first rains to be contemplated for 1943. The study continues of sudden death of clove-trees, based on the findings of Dr. A. H. Campbell (*A.R. Dep. Agric. Zanzibar for 1940*, and *Crown Colonist*, 1941, 11: 381; *H.A.*, 11: 934). Mulching to conserve soil moisture had no effect on the disease. An experiment in heavy watering during rainless periods of a healthy block in a "sudden death" zone is in progress. Boron treatment had no beneficial effect. Preliminary experiments with minor nutritional elements have now been undertaken. A species of *Loranthus*, suspected as a carrier should the condition prove to be due to virus, could not be grafted successfully on to healthy trees. Regeneration by replanting without disturbance of the soil ecology, i.e. by underplanting the dead, dying cloves, since planting after clear felling was unsuccessful, is now in hand. The soil, it is recognized, will need amelioration and preliminary manurial trials with young cloves on land which has been under cloves for 50 years have produced significant results. Examination of oil content of selected high, medium, and low oil yielders indicate that though the oil content in cloves can vary over a wide range it remains relatively constant for the individual tree. Pruning in various degrees, to produce dwarf trees for easy picking, injured the trees, sometimes fatally, and substantially reduced the crop in those that lived. In pineapple manurial experiments the marked effects of sulphate of ammonia in increasing number and weight of fruit recorded for the previous two years (Briant and Tidbury, *E. Afr. agric. J.*, 1942, 8: 80-4; *H.A.*, 13: 619) were not repeated. Sulphate of ammonia this time significantly reduced the number of fruits per acre, though nitrogenous manures still caused an increase in average weight of fruit. The spacing experiment confirmed previous results though general production was very much lower in all experiments. Two successful methods of obtaining papain from young fruits of *Carica papaya* were developed. (1) Spreading the fresh fluid on sheets of glass in shade on sun and scraping away cleanly with a knife when dry. (2) allowing the latex, sterilized with a little formalin, to coagulate in a glass vessel. On coagulation the jelly was forced through holes in a perforated zinc sheet into a form resembling vermicelli and dried on large sheets of copper cloth tacked on to wooden frames. The enzyme activity tested after 8 months' storage was satisfactory. Work on cassava in connexion with the search for mosaic-immune varieties continued. It was found that the characters of cuttings were often markedly different from those of the seedlings from which the cuttings were taken.

The following also are noted:—

426. *A.R. Dep. Agric. Nyasaland Protectorate, 1942*, 1943, pp. 16, 2s. 6d.  
*A.R. Dep. Agric. Palestine for year ended 31 Mar. 1940*, pp. 4.